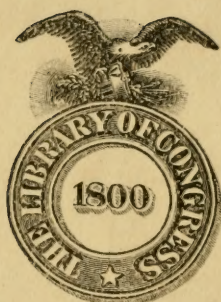


PLANT ...
CULTURE



Class SB93

Book 105

Copyright N^o 1921

COPYRIGHT DEPOSIT



PLANT CULTURE

PLANT CULTURE

A WORKING HANDBOOK OF
EVERY DAY PRACTICE FOR ALL
WHO GROW FLOWERING AND
ORNAMENTAL PLANTS IN THE
GARDEN AND GREENHOUSE

BY

GEORGE W. OLIVER

Propagator to the Bureau of Plant Industry,
U. S. Department of Agriculture

AND

ALFRED CARL HOTTES

Assistant Professor of Horticulture, Ohio State University

FOURTH EDITION

NEW YORK
A. T. DE LA MARE CO. INC.
1921

SB93
C5
1921

COPYRIGHT

Entered According to Act of Congress in the
Year 1900 by

A. T. DE LA MARE PRINTING AND PUBLISHING COMPANY, LTD.
New York

SECOND EDITION, REVISED

Copyrighted 1909 by

A. T. DE LA MARE PRINTING AND PUBLISHING COMPANY, LTD.
New York

THIRD EDITION, REVISED

Copyrighted 1912 by

A. T. DE LA MARE PRINTING AND PUBLISHING COMPANY, LTD.
New York

FOURTH EDITION, RE-WRITTEN AND RESET

Copyrighted Nov. 1920 by

A. T. DE LA MARE CO., INC.
New York

All Rights Reserved

JAN 26 1921

©CL.A605565

Preface to Third Edition

In nearly all of the recent works of this nature, appearing in America, the subjects dealt with have been confined, more or less, to those plants that can be and are cultivated by commercial florists for profit, or by those who own conservatories. And while the present book includes all this class of information it has a far wider scope, treating, as it does, on the care and management of a diversity of plants not touched upon by other writers, all equally necessary in the adornment of our gardens and homes and, for this purpose, as beautiful and interesting as those that generally receive the greatest attention from authors of most horticultural works. Divested of superfluous verbiage, and shorn of perplexing technicalities which tend to confuse, the cultural directions here given can be easily and successfully followed, the results contributing to the perfect enjoyment of "the purest of human pleasures," by some, and affording to others a lucrative occupation.

What I have given here are teachings gleaned and sifted from the experience of many years' work as a gardener. The methods described are such as have been successfully practiced by me and can be safely relied upon as up to date and thoroughly applicable to American conditions and requirements.

While the notes have been made short, they will, nevertheless, in most cases, cover the essential points in the methods of raising and caring for the plants named, and be understood by the average reader as easily as if they had been dealt with in longer articles. Hitherto, the information available on the subjects treated upon has, for the most part, been widely scattered in numerous magazines and books, many of which are expensive; and it is often found necessary to search through a mass of technical details in order to find the required information. It is to be hoped that the present volume will, in great measure, reduce the difficulties referred to, and render the art of plant cultivation profitable and enjoyable to the many whose tastes are horticultural.

GEORGE W. OLIVER

Washington, October, 1912

Preface to Fourth Edition

The undertaking of this fourth edition was assumed with extreme reluctance by the writer because of the eminence of Geo. W. Oliver in the field of plant culture and propagation.

In this practically rewritten and enlarged volume much additional cultural matter and many new subjects have been incorporated, every endeavor having been made with a view of presenting an epitome especially of those plants which figure in present day cultivation.

Some progress has been made in the twenty years since the first edition was printed; many flowers have gained or waned in popularity. Every effort has been made to preserve the practical style of Mr. Oliver which has served in the past as authority for thousands of gardeners.

The writer is indebted to Messrs. Carl E. Haas and Sylvester Pautler, students, who have assisted with several chapters. Bailey's Standard Cyclopedia of Horticulture has been used as authority for nomenclature.

ALFRED CARL HOTTES

OHIO STATE UNIVERSITY,
Columbus, O.
November, 1920.

Contents

(For complete index see pages 441, 442).

Preface.....	7
Chap. 1—General Cultural Notes.....	13- 21
Potting Soils.....	13
Potting Plants.....	13
Watering.....	20
Mulching.....	21
Chap. 2—Propagation.....	23- 33
Cuttings.....	23
Division.....	24
Seeds.....	24
Graftage.....	26
Cleft Grafting.....	28
Tongue, or Whip Grafting.....	29
Saddle.....	29
Crown.....	29
Veneer.....	29
Inarching.....	29
Root Grafting.....	29
Budding.....	30
Layering.....	30
Chap. 3—Scientific Names.....	34- 37
Chap. 4—Hybridization of Plants.....	39
Saving Seed from Desirable Plants.....	42
Chap. 5—Plant Enemies.....	43
Diseases—Fungicides.....	44
Insects—Insecticides.....	46- 50
Commoner Diseases and Insects Affecting Ornamental Plants.....	50
Chap. 6—Greenhouse and Conservatory Plants.....	52-163
Chap. 7—Hardy Perennials.....	165-221
Chap. 8—Annuals.....	222-241
Chap. 9—Bulbous Plants.....	242-277
Chap. 10—Bedding, Vase and Window-Box Plants.....	278-292
Chap. 11—Hardy Shrubs.....	293-340
Chap. 12—Roses.....	341-359
Chap. 13—Vines—Hardy and Tender.....	360-382
Chap. 14—Ferns and Lycopods.....	383-401
Chap. 15—Water Plants—Waterside Plants.....	402-414
Chap. 16—Ornamental Grasses.....	415-422

Illustrations

	Page		Page
Abutilon Savitzii.....	53	Cocos Weddelliana.....	142
Acalypha musaica, Avenue of.....	54	Cornus florida.....	304
Acer polymorphum atropur- pureum.....	294	Crossing Technique.....	41
Achillea ptarmica.....	164	Cross-Pollination, Successful Result of.....	358
Aconitum.....	167	Croton punctata.....	102
Adiantum California.....	389	Cryptomeria japonica.....	306
Adiantum Croweanum.....	388	Cutting placed at side of pot. 14	
Æsculus parviflora.....	295	Cyclamen.....	107
Ampelopsis Veitchii.....	362	Cyperus alternifolius.....	416
Anemone japonica.....	171	Cypripedium acaule.....	66
Anthericum.....	57	Cyrtomium Rochfordianum.....	393
Anthurium Andrænum.....	58	Daisy-like Flower.....	40
Aquilegas.....	35	Deutzia gracilis.....	44
Arabis albida in a Rockery.....	174	Digitalis.....	187
Ardisia crenulata.....	62	Dracænas, Good Commer- cial.....	112
Aristolochia Sturtevantii.....	364	Dracæna Sanderiana.....	114
Asclepia Curassavica.....	281	Erianthus Ravennæ.....	418
Begonia Gloire de Lorraine. 72		Erica melanthera.....	116
Begonia Mrs. J. A. Peterson. 74		Geranium Cutting.....	23
Begonia Rex, Rooted Cut- ting of.....	71	Gladiolus.....	261
Bocconia cordata.....	179	Grafting: Cleft.....	28
Caladium "Her Majesty"...	248	Veneer.....	30
Calathea zebrina.....	78	Whip or Tongue.....	29
Calla Godfrey.....	276	Hedera helix.....	372
Calycanthus floridus.....	300	Helleborus niger.....	22
Campanula medium.....	181	Heuchera sanguinea.....	192
Campanula persicifolia alba..	19	Hippeastrum.....	245
Campsis radicans.....	366	Hydrangea hortensis.....	131
Carnations, House of.....	82	Hydrangea paniculata grandiflora.....	314
Carnation, Mrs. C. W. Ward. 85		Insects, Sucking and Biting. 46	
Cattleya labiata.....	90	Iris Madam Chereau.....	194
Cattleya, Plant of, Showing Air Roots.....	140	Pallida dalmatica.....	195
Cercis japonica.....	302	Rhizome of.....	197
Chorizema cordata splendens 92		Lævigata.....	198
Chrysanthemums.....	95	Kalmia latifolia.....	319
Cinerarias, Varieties of.....	99	Lantana.....	286
Clematis paniculata.....	369	Layers of Various Sorts.....	32
Clerodendron Flowers in Dif- ferent Stages.....	370		

	Page		Page
<i>Lilium candidum</i>	267	<i>Rhus Cotinus</i>	332
<i>Lychnis viscaria</i> var. flore pleno.....	202	<i>Ricinus communis</i>	237
<i>Magnolia Soulangeana</i>	324	<i>Rose Columbia</i>	345
<i>Marguerite</i> , Boston Yellow.....	136	<i>Rose Dr. W. Van Fleet</i>	354
<i>Mignonette</i>	235	<i>Rose Frau Karl Druschki</i>	342
<i>Musa ensete</i>	285	<i>Rose Hoosier Beauty</i>	348
<i>Nelumbiums</i>	406	<i>Rose Los Angeles</i>	346
<i>Nephrolepis Teddy Jr</i>	395	<i>Rose Lucile</i>	352
<i>Nymphæa</i> , Viviparous Leaf of.....	408	<i>Rudbeckia Newmanii</i>	213
<i>Nymphæas</i>	410	<i>Sansevieria</i> , Leaf Cuttings of.....	152
<i>Oxalis Bowiei</i>	272	<i>Sarracenia</i>	154
<i>Pæonia Moutan</i>	16	<i>Schizanthus</i>	240
<i>Pandanus Veitchii</i>	144	<i>Selaginella Emmeliana</i>	400
<i>Pansies in border</i>	226	<i>Solanum Capsicastrum</i>	49
<i>Papyrus antiquorum</i>	420	<i>Spore Bearing Parts in Various Genera of Ferns</i>	384
<i>Pea Blossom</i>	38	<i>Styrax japonica</i>	335
<i>Peony festiva maxima</i>	206	<i>Squash Blossom</i>	41
<i>Peperomia</i> , Leaf Cuttings of.....	146	<i>Sweet Peas</i>	158
<i>Petunias</i> , Single.....	230	<i>Tomato Blossom</i>	38
<i>Philadelphus coronarius</i>	328	<i>Typical Flower</i> , Section of....	38
<i>Phlox subulata</i>	209	<i>Veronica spicata rosea</i>	220
<i>Poinsettia</i>	119	<i>Viburnum plicatum</i>	337
<i>Polypodium glaucum</i>	398	<i>Victoria Regia</i>	413
<i>Primula malacoides</i>	123	<i>Vinca rosea</i> with <i>Clematis</i> in background.....	291
<i>Primula obconica</i>	128	<i>Window Box Gardening</i>	279
<i>Privet Hedge and Clematis Arbor</i>	322	<i>Wistaria multijuga chinensis frutescens</i>	381
<i>Properly Potted Plant</i>	14	<i>Xanthoceras sorbifolia</i>	339
<i>Pueraria Thunbergiana</i>	378		

Supplementary Book List

Where more extended information is sought on any given subject, the reader is referred to the following excellent list of books, all obtainable from the publishers of Plant Culture, except those marked "out of print," which may, however, be found in any good library:

Annuals, The Book of.....	Henry H. Saylor
Asters, How to Grow.....	George Arnold
Bulb Book, The.....	John Weathers
Bulbs and Tuberous Rooted Plants.....	C. L. Allen
Carnation Culture, Commercial.....	J. Harrison Dick
Carnation, The American.....	C. W. Ward—Out of Print
Chrysanthemum Manual.....	Elmer D. Smith
Ferns, Book of Choice.....	G. Schneider
Color Standards and Color Nomenclature.....	Robert Ridgeway
Floral Designing, Manual of.....	W. Cleaver Harry
Floriculture, Practical.....	Peter Henderson
Floriculture, The Principles of.....	Edward A. White
Flower Garden, English.....	Wm. Robinson
Flower Garden, The American.....	Neltje Blanchan
Fungous Diseases of Plants.....	Benjamin M. Duggar
Garden Craft in Europe.....	H. Inigo Triggs
Garden Flowers, Our.....	Harriet L. Keeler
Garden Guide or Amateur Gardeners' Handbook.....	A. T. De La Mare
Garden, The Amateur.....	Geo. W. Cable
Gardening, Encyclopedia of.....	John C. Loudon
Gardening, Illustrated Dictionary of.....	Geo. Nicholson—Out of Print—New Edition in Preparation
Gardening, Manual of.....	L. H. Bailey
Gardening, What England Can Teach Us About.....	Wilhelm Miller
Gardening, Window.....	Herman B. Dörner
Genetics in Relation to Agriculture.....	Ernest B. Babcock and Roy E. Clausen
Greenhouse Construction.....	L. R. Taft
Greenhouse Management.....	L. R. Taft
Greenhouses: Their Construction and Equipment.....	Wm. J. Wright
Horticulture, Standard Cyclopedia of.....	L. H. Bailey
House Plants, Milady's.....	F. E. Palmer
Iris Manual.....	C. S. Harrison
Landscape Gardening.....	F. A. Waugh
Landscape Gardening, Practical.....	Robt. B. Cridland
Nursery Book, The.....	L. H. Bailey
Peony Manual.....	C. S. Harrison
Phlox Manual.....	C. S. Harrison
Plant Breeding.....	L. H. Bailey and A. W. Gilbert
Plant Culture, Principles of.....	Emmett S. Goff
Plant Propagation, Commercial.....	Alfred C. Hottes
Plant Propagation, Greenhouse and Nursery Practice.....	Maurice G. Kains
Propagation of Plants, The.....	Andrew S. Fuller
Rose, The.....	H. B. Ellwanger
Rose Culture, Commercial.....	Eber Holmes
Rose Growing, Outdoor, The Practical Book of.....	Geo. C. Thomas
Roses, How to Grow.....	Robert Pyle
Shrubs, Our Northern, and How to Identify Them.....	Harriet L. Keeler
Sweet Peas for Profit.....	J. Harrison Dick
Violet Culture, Commercial.....	B. T. Galloway
Violets, How to Make Money Growing.....	George Saltford
Water Gardening, The Book of.....	Peter Bisset
Water Lilies and How to Grow Them.....	H. S. Conrad and Henry Hus

CHAPTER I

General Cultural Notes

POTTING SOILS. Loam is the principal soil used for most plants. It is a medium mixture of sand and clay. If containing much clay it is made lighter and more porous by adding peat, leaf-mold, and sand.

It is a surprise to many persons to realize that the soil furnishes only about two per cent of the materials in the plant; the other 98 per cent is derived from air and water. The physical condition of the soil is more to be studied than its chemical constitution. For certain plants, such as Rhododendrons and Ericas, lime is injurious, so that the peaty soils are used. Cacti, Agave and like plants prefer sandy soils. Orchids, and many of the aroids prefer a soil consisting principally of fern roots. Charcoal is used advantageously to keep the soil sweet. It is used to advantage in potting plants which are to remain in their pots for some time. The best loam is obtained by allowing grass roots to decay by being piled for a year or two. Such soil will be full of fiber.

For potting, no fresh manure should be used, but should always be allowed to decay so that there is no heat left in it. Cow manure makes the best sort for use. Sheep manure, dried and pulverized, is used frequently for top-dressing plants in pots. Finely ground bonemeal also makes an excellent fertilizer for pots.

Soil should be used which is just moist and fibrous enough so that it almost hangs together when grasped in the hand, but falls apart easily. All plants are grown in small pots in order to take up as little room as possible; furthermore, if too much soil is available it frequently becomes sour.

POTTING PLANTS. No rules for potting plants can be laid down which would apply equally to all kinds of plants grown in pots. Different kinds of plants require different treatment in this respect. Some require that the soil be rammed quite firmly about the old ball; these, as a rule, are hard-wooded plants, with fine roots, such as Heaths and Azaleas. Palms thrive best in a moderately well-

firmed soil. Soft-growing plants are less fastidious in this respect. Again, there are definite seasons when certain plants should be potted. The hard-wooded kinds are usually potted in Spring before active growth commences. Ferns are given their annual shift before starting into growth; many of them, however, will stand shifting several times during the year. But for all plants it may be stated that the beginning of their resting season should find the ball of earth well supplied with roots, for if given a shift when growth is completed water will lodge in the fresh soil, and this will turn sour and almost certainly cause the plant to become sickly. Plants with fine, hair-like roots should only be given small shifts; rapid growing plants and those with large roots will take larger shifts. In every case the ball should be moderately moist when potting. Plants in the younger stages of their existence, whether seedlings or cuttings, require the soil to be of a finer nature than

when older, when it may be rough and fibrous, and, in the case of those which need it, manure of some kind added. In putting ordinary plants in pots above



FIG. 1

Properly potted plant. Note the half-inch space at top for water and the crockery at the bottom



FIG. 2

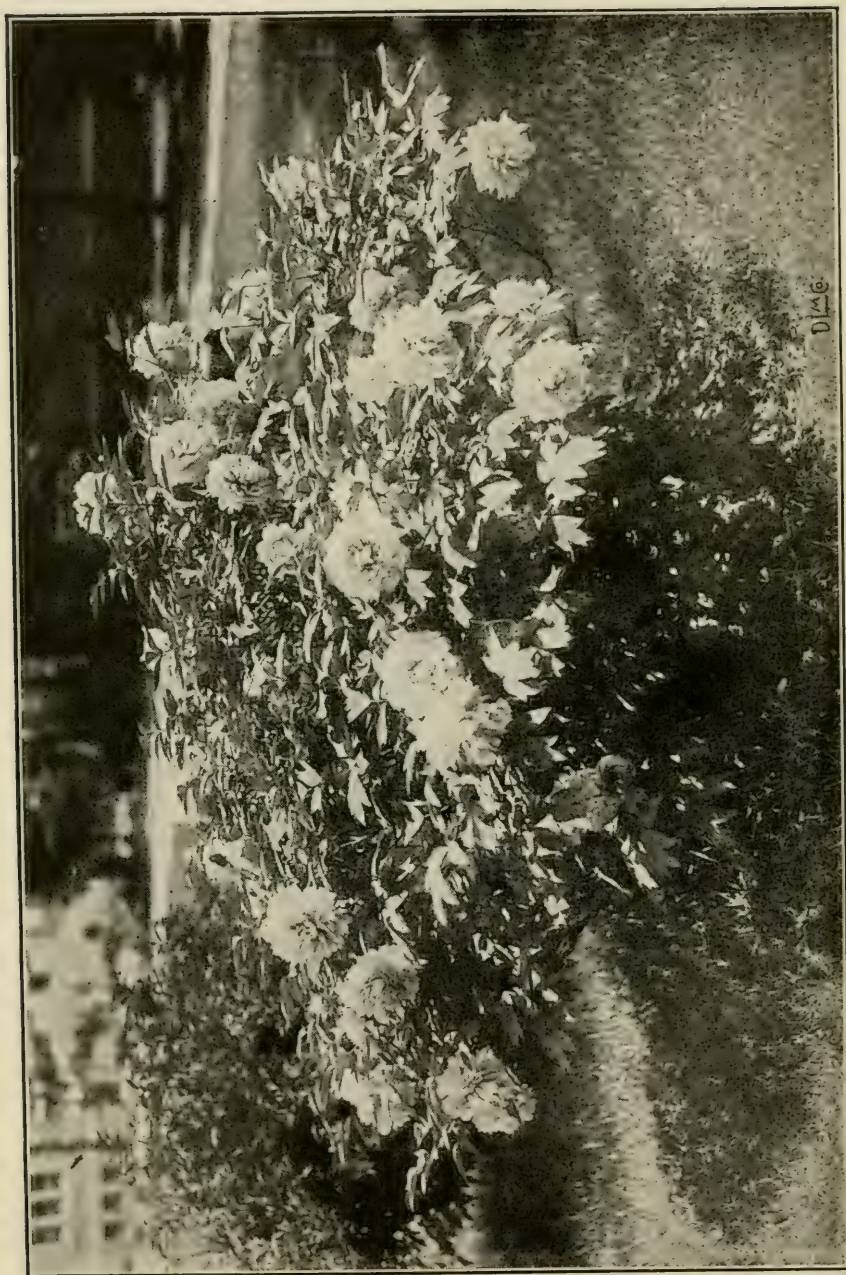
Cutting placed at side of pot when it is not well provided with roots; the plants will often be better than setting in center of pot

the size of 4- or 5-inch, the firming of the soil should be done with the aid of a piece of wood about $1\frac{1}{2}$ inches wide and $\frac{1}{2}$ -inch thick, or larger, for very large plants. Enough space should always be left at the top of the pot, so that when the ball of earth is in need of water one application will be sufficient to wet it through.

In potting cuttings it is the usual custom to put in soil to one-third the depth of the pot; the cutting is put in place, the remaining space filled up with soil, then the bottom of the pot is knocked several times on the bench, after which the plant is slightly firmed with the thumbs. It is preferable to have the knocking precede the firming with the thumbs, for this reason: When the cutting is placed in position, the soil added and thumb-firmed, the soil does not get well distributed among the rootlets nearly so well as when the pot is given one or two gentle knocks before the thumbs are used. For most plants in the cutting stage the thumbs should be used for evening the surface more than for firming. Another reason, just as weighty as the last, is that pressure from the thumb acts unevenly on the roots, pressing down opposite sections, while the intervening spaces containing the tender roots are stationary. This must necessarily result in twisting and wrenching, which dangers are done away with, or at least lessened, by first firming with the knocking process. (See Fig. 1.)

Again, all the cuttings of a batch will not have the same quantity of roots, and therefore they should get different methods of treatment in potting. Those which have a satisfactory number of roots may be put in the middle of the pot, according to the usual custom; but those which have few roots, and which look as if they would benefit by being left in the cutting bed for a longer period, will, as a rule, come along all right if placed at the edge of the pot instead of at the middle. The roots in this position make progress rapidly, and the plantlets can easily be given a place in the middle of a pot during their next shift. Cuttings with very fine roots should always be treated in this way. (See Fig. 2.)

Many cuttings, when ready for potting, will be found to have the roots pointing downward from the base of the cutting instead of radiating from it; these are often delicate and easily bruised, but they can be preserved by taking some soil in one hand, letting the fingers accompany it into the pot, and before withdrawing them press the soil against one side of the pot; place the roots against this and fill up with soil. In course of time practice will enable the operator to pot cuttings as rapidly by this as by the ordinary method. In potting cuttings during the Winter months very great



D. 126

PEONIA MOUTAN—DOUBLE PINK TREE PEONY.—See page 326

care should be exercised in preventing a check through putting them in soil which is of a lower temperature than the sand from which they have been taken. It should not vary more than two degrees at the time of potting. This precaution is especially important in the potting of the warmth loving conservatory plants.

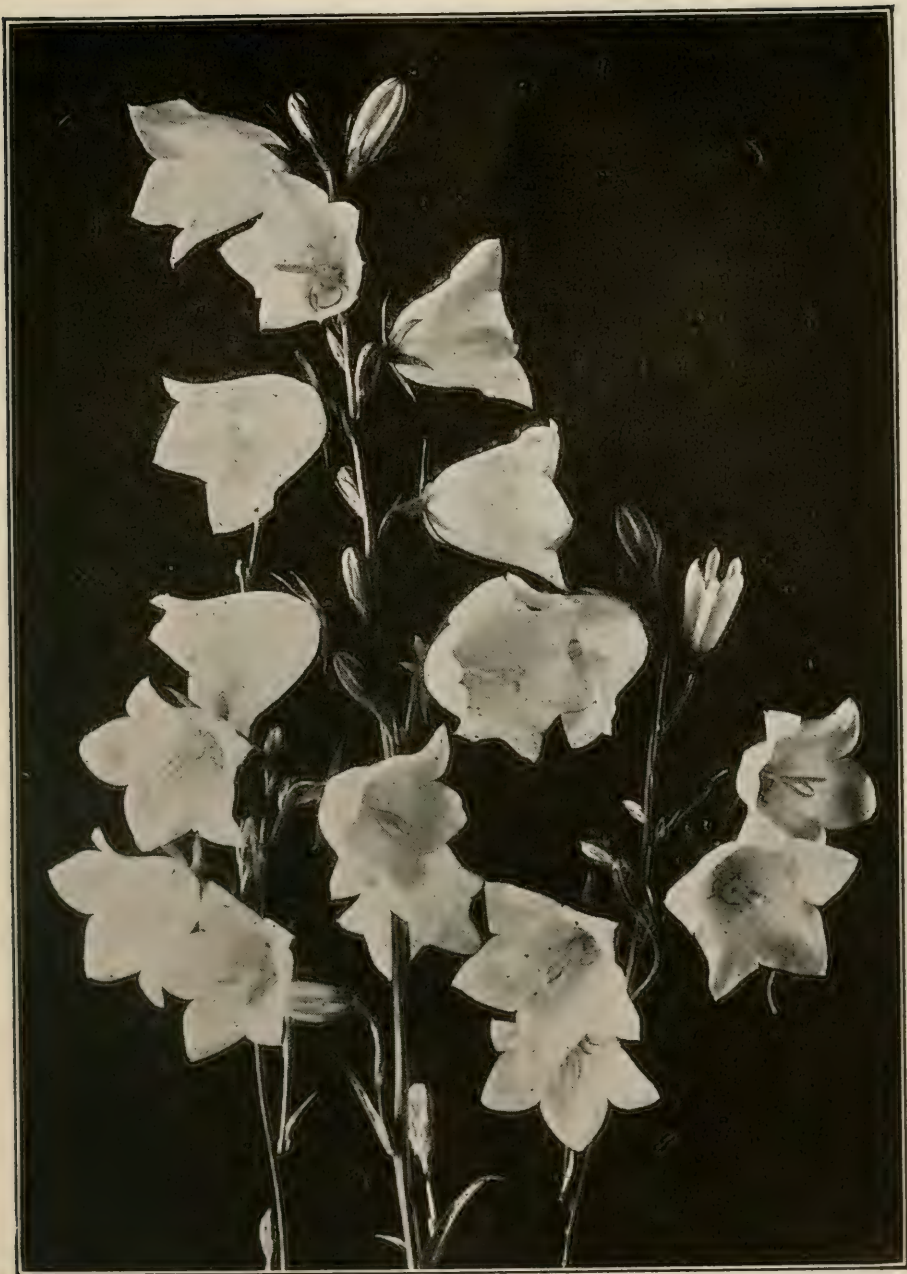
Clean Pots. It is the common custom, and a bad one, to put plants in dirty pots with merely the rough of the soil remaining in them being removed with a stick or cloth before using. This operation takes more time than washing. A large number of pots submerged in a big tub of water and allowed to stand for a few days will have the material adhering to them softened so that with a piece of woollen cloth and a boy that knows how, a large number can be cleaned in a short time so that they will be as good as new. There is no doubt that dirty pots work to the injury of the plants in them. The inside soil adhering to the pot after use prevents a plant being easily knocked out and the green on the outside tends to make the pot less porous; besides, a plant looks better by far in a clean pot than in a dirty one. New pots or thoroughly dried, clean ones should not be used until they have been dipped in water immediately before using, as they are apt to absorb too much of the water meant for the plant after potting. Have divisions in the potting shed for each size; it saves both time and pots, and when potting is to be done everything goes along more smoothly when the various materials are ready at hand. There is usually more time wasted in gathering the necessary sizes from here, there and everywhere, wiping out a few at a time and punching a stick through the aperture at the bottom than would be spent over the work if it were properly done. System counts in this as in everything else.

Drainage. Crocking or arranging pieces of broken pots or other material over the hole in the bottom of the flower pot for drainage is an operation to which too little attention is apt to be given. For quick-growing soft-wooded plants in small pots, or for those which are intended to remain in the pot only for a short time, there is no necessity for an elaborate system of drainage. Especially is this the case where the ball of earth becomes so dry as to require watering at least once a day. With plants of this nature, in pots above the size of 3-inch, a little rough material thrown in the bottom will give compensatory results; but as usually done this work takes more time than if the pots were supplied in the regular way with potsherds. The rough pieces of the potting soil are gathered up by hand and put in the pots as potting proceeds.

A better way will be secured as follows: Soil which is to be used for cuttings, and which is screened, will give excellent material in the rough pieces which do not pass through the meshes; this should be saved, mixed with thoroughly rotted cow manure, and put in a box conveniently situated for future use. This gives splendid material for drainage, especially for bedding plants, such as Geraniums in 4-inch pots, Cannas in 5-inch pots, and for young Chrysanthemums. It will be found that that part of the pot holding this mixture will have a great attraction for the roots. Where the pots are to serve for growing plants in for any length of time, potsherds should be used. With Palms, Ferns and such plants as Pandanus, Dracena and Maranta a carefully crocked pot is of great importance in healthy root action. For Caladiums, Alocasias, Anthuriums and other plants which require an abundant supply of water, careful drainage is an absolute necessity. With fine-rooted plants, such as Heaths and Azaleas, drainage is equally important. It will be found good policy to have a supply of the different sizes of crocks on hand all the time. The crocks should consist of three sizes, the largest size in pieces from two to three inches across; the next large enough to go through a No. 1 sieve, and the small size from one-quarter to one-half-inch in diameter. The quickest way to procure the different sizes is to break up the potsherds with a good-sized hammer, so that the largest pieces are from two to three inches across; put into a No. 4 to 6 sieve to screen out the dust and smaller particles, which may be thrown away. Next screen through a half-inch sieve and these will serve as the smallest-sized crocks. The pieces which the half-inch sieve retain put into an inch sieve. This will give the second size, and what is left will answer for pieces to put over the holes in the bottoms of the pots. All three sizes should be kept in separate boxes, or divisions on the potting bench, handy for use.

In crocking, spread out a number of pots on the bench, take a piece of broken pot about twice the diameter of the hole in the bottom of the pot, place the concave side of the crock directly over the hole. If the pot is a small one, a few of the smaller-sized crocks over the larger pieces will be sufficient; but if a 6-inch pot, or larger, is it best to arrange a few large pieces around the first piece, finishing off with smaller ones.

On top of the crocks, to prevent the soil from getting among them, either during the operation of potting or from being washed down afterward, sphagnum moss is often used, although this is not the best material for the purpose, as it is apt to retain moisture



CAMPANULA PERSICIFOLIA ALBA.—See page 180

This plant is commonly known as Peach Bells, being a biennial, the seed is sown one year but the plants do not bloom until the next, but after this the plants cannot be depended upon to bloom again.

to a greater extent than the soil above it. Half decomposed leaves are preferable.

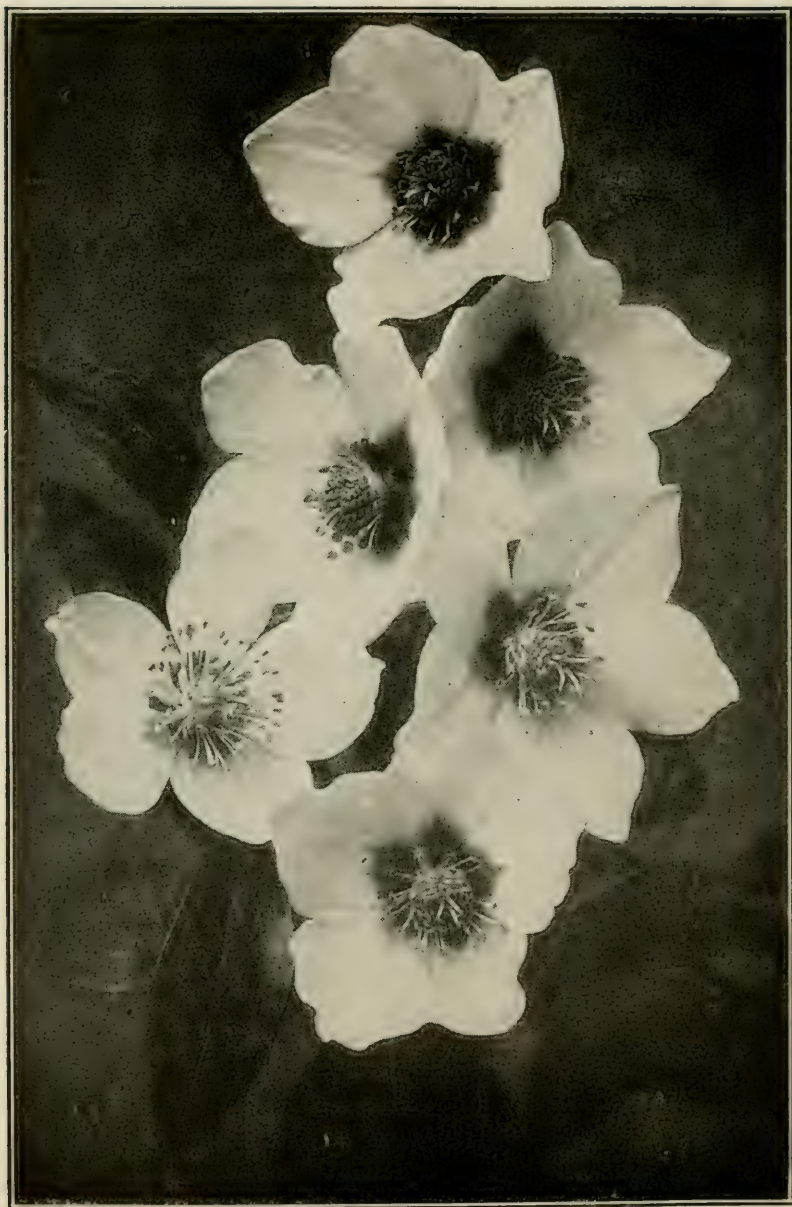
WATERING. This is the most important work that falls to the lot of the plant grower. It cannot be learned by reading a paper or a book on the subject, and the man who wields the watering can, or hose, no matter how intelligent he may be, will water plants for years after a fashion, and yet have a great deal to learn. About all that can be said on the subject is to water a plant when it needs it. The trouble lies in knowing when it needs it. The operator should first know the plant, all about it, where it comes from, whether it inhabits a bog or a mountain top, whether it is rapid or slow growing, its natural periods of growth and rest, and the same under cultivation. Next he must know the condition of the roots, the kind of soil it is potted in and when potted. Among other things he should know will be the chemical composition of the water, and whether it is suitable for the plants he is watering. The temperatures of the soil and water during the operation is another important item. Next he should frequently go over different plants in different soils, knock one out of its pot here and there an hour or so after watering, to ascertain whether the ball has been wet an inch or two below the surface with the remainder dust dry, or if the happy medium has been struck. In short, it may be said that the successful cultivator understands how and when to water only after years of experience. Watering with the hose is often the cause of a good deal of harm, both to plants on benches, in the open ground, and in pots, owing to the manner in which water is applied. It is a favorite method with some to force the water out of a small nozzle to a distance of 20 feet, or a less distance, with the finger partly over the end of the hose. A better method than this could not be designed for the packing of the soil, washing it into cakes by breaking it up into fine particles and filling up the interstices with thick muddy water; and when the sun shines, if the ground be not gone over with the cultivator or loosened up in some other way, the surface soil gets as hard as a brick, and the roots near the surface are subjected to a temperature far above what is good for them. To do away with the necessity for this method of watering the hose should be short in length, and stop cocks more frequently placed. For outside work lengths of temporary iron piping screwed into position wherever necessary should be provided so as to use the hose low down among the plants, never allowing the water to be squirted on the soil. A good plan is to use distributors, one of

which can be made in a few minutes if the necessary material is at hand. Take a piece of zinc, about a foot long and 5 inches wide, bend the sides for half its length so as to clasp the end of the hose to hold it in position, and tie with wire. The other end should overlap the end of the hose by about 6 inches, and be turned up slightly so as to meet the water, distributing it in such a manner as will enable the soil to absorb it without being disturbed in the least. This will also prevent the foliage and flowers from being spattered with muddy water.

MULCHING. This consists of covering the surface of the soil with any loose material, such as well-rotted manure, cocoanut fiber, stable litter, or half-decayed leaves. It acts in retaining the moisture in the ground for the benefit of vegetation instead of being lost by rapid evaporation. The soil, especially after heavy rainstorms, gets a firm crust on the surface which ultimately cracks open, readily parting with the moisture to a good distance beneath the surface; thus the mulch acts as a layer between the drying influence of the atmosphere and the surface of the soil, preventing it from getting hard and keeping it open.

A good mulch, besides preventing evaporation is, to a certain extent, similar in its action to a loose, silty surface soil, drawing up the moisture from several feet below the surface. Mulching is also beneficial, because if manure is used in which there is any feeding substance it is washed down to the roots of the plants by heavy rains. Cultivating acts in a similar manner to mulching, as the soil which is loosened may be said to be a mulch of loose soil; but to be of the greatest service this operation should be performed after every shower of rain.

Plants in pots need the surface stirred occasionally, partly for the same reason that plants in the open ground are benefited by frequent cultivating. The top layer of soil in the pots gets into a caked condition; this is indicated at times by the water standing on the surface longer than usual, and is caused by the particles of soil being reduced by the action of the water to a muddy state, forming a kind of puddle through which water takes a long while to percolate. Besides this many sorts of the lower forms of plant life readily start causing a green moldlike growth to form upon the soil; this gives the pots an unsightly appearance. When potting, a little rough sand scattered on the surface is an excellent preventive, keeping the whole mass porous and doing away with the necessity of frequent stirring.



HELLEBORUS NIGER (CHRISTMAS ROSE)

This perennial blooms in the Winter at every opportunity it gets to receive a little sunshine.

CHAPTER II

Propagation

All plants may be propagated by one or more of the following methods: Seeds, spores, bulbels, budding, grafting, layering, cuttings of the stems, twigs, leaves and roots, suckers, divisions of the crowns or by stolons or runners.

Cuttings. Cuttings are usually made from dormant wood in the cases of shrubs and trees whether they be evergreen or deciduous; and in the case of soft-wooded plants the growths most recently made are those selected. Cuttings of leaves sometimes root freely and produce young plants or tubers, as in *Begonia Rex* and *Gloxinia*. There are many devices in which to root cuttings, such as double bell glasses placed over double pots, one of the pots being supplied with water, the other with sand; hand lights, and so forth; but they are of little service and are seldom used. Deciduous shrubs are usually propagated out of doors. Hardy perennials, such as *Iberis*, *Dianthus* and *Phlox*, are propagated in coldframes. Many of the evergreen shrubs do well in a propagating house from which frost is kept out, while the tender plants, both hard- and soft-wooded, are rooted in an open bed of a warm house the atmospheric temperature of which does not fall lower than 55 degrees during the coldest weather. For plants which need more heat a propagating frame is easily erected in the warmest part of the house; this, with a minimum bottom heat of



FIG. 3—GERANIUM CUTTING

Note that the lower leaves have been removed. The cut at the base is through an eye or node.

75 degrees, serves for *Nepenthes* and other plants slow to root under ordinary conditions.

Division. Propagation by suckers, division, stolons and runners is an easy matter, and each species so treated readily suggests the means to be employed. Many plants difficult to propagate by the usual methods of cuttings of the branches yield readily to cuttings made from the roots. The Moss Rose is a familiar example. *Clerodendron*, *Fatsia*, *Paulownia imperialis*, Raspberry, Blackberry and *Xanthoceras* all come freely from roots. Among the herbaceous plants the roots of *Anemone japonica* and *Lychnis vespertina*, when cut up quite small, will give plants from every piece. Indoor plants, such as *Manettia cordifolia* and *Cephælis Ipecacuanha*, will give plants more readily by this method than any other.

Seeds. The soil in which to sow seeds, especially that portion of it which is near the surface, and in which there are weed seeds, should be prepared beforehand so as to avoid the necessity of pulling up the weeds and the consequent danger attending the operation of dislodging the seeds which we wish to germinate, especially during the process of germination. The most natural method is to spread the soil out on a flat surface in a hothouse and encourage the weed seeds to germinate by the aid of heat and moisture. The soil should be spread out quite shallow, and in a few days' time the seeds that are likely to prove most troublesome will have germinated. The weeds that one finds most noxious are quick in germinating, and will be rendered harmless by this method. They are principally *Lamium*, *Plantago*, Ragweed, Grasses, *Draba*, *Anthemis*, *Rumex*, *Portulaca*, *Acalypha*, *Oxalis* and *Trifolium*; but the list varies with different localities. Burning or steaming the soil is often resorted to, but for seed sowing I prefer the other method as more likely to rid the soil thoroughly of the common, troublesome weeds. Soil intended for use in connection with raising Ferns from spores should be treated even more carefully, in order to destroy every vestige of vegetable life. To do this thoroughly the soil should be boiled for a reasonable length of time, and afterward dried in the sun.

Seedlings which from their nature require pricking off (that is, putting around the outer edge of the soil in pots, or in rows, in boxes) shortly after the seed leaves are developed, should be raised in seed pans which have at least half their depth devoted to drainage. Most of this should consist of pieces of broken pots, or cinchers, covered over with some rough material, such as half-decayed

leaves, to prevent the soil washing down. In very shallow seed containers, whether pans or boxes, the bottom part should be covered with rough screenings, with finer soil above, and pressed moderately firm. In covering the seeds the old rule is to cover the seed with its own thickness in soil, and if followed out few mistakes will be made. The coverings should not be of such a nature as to bake readily; finely screened sphagnum moss mixed with sand is a good substance with which to cover almost any medium-sized seeds that take a reasonably short time in germinating, as it retains moisture without imparting too much to the soil below.

Very small seeds, such as those of *Begonia* and *Gloxinia*, do not need any covering; but to preserve a humid atmosphere around them, or to furnish the conditions necessary for germination, they must be covered with something which prevents a too rapid evaporation of moisture. This is supplied by a pane of glass, which should be kept on until the seed leaves appear. It need not fit tightly, so as to preclude the possibility of a slight circulation of air; where this is the case the seedlings are apt to die from fungous attacks, even before the seed leaves are developed. Where glass is used as a covering for small seeds the soil ought to be moderately moist before sowing.

Thickly sown seed is an evil to be guarded against; a crowded box or pan of seedlings, whether they be Ferns or flowering plants, is next to useless, because shortly after germinating the seedlings begin to get weak and never afterward make such healthy plants as those which get a chance to form short, stocky growth—enough at least to enable one to handle them easily during the operation of pricking or potting off. Seeds, as soon as germinated, as a rule, should not be kept in a shaded place, as then they are apt to get “drawn”; that is, too much length between the surface of the soil and the seed leaves. Most seedlings in the early part of the season will stand all the sun they can get. This especially applies to seedlings of such plants as *Phlox Drummondii*, Madagascar Vincas and Verbenas. Among herbaceous perennials some of the *Delphinium* and *Rheum*, also many of the umbelliferous plants, have seedlings with the petioles of the seed leaves forming a long tube and looking as if they were very much “drawn,” no matter whether grown in sun or shade. But this is their nature, as the plumule has to penetrate the tube near the base in order to reach the light, instead of between the blades of the seed leaves.

A great many kinds of plants in the seedling stage, when pricking off becomes necessary, are not of sufficient size to go into small

pots; in these they take up too much room and are apt to suffer from too much or too little water. One will get dry here and there, and the chances are that when water is given others in the neighborhood will get water when they do not need it. Putting several in a pot is just as unsatisfactory, as they must be divided up as soon as sufficient growth is made, and repotted. This applies especially to herbaceous plants which have a large number of fibry roots instead of a tap root.

The plan of putting the seedlings in boxes, when large enough to handle, is the most satisfactory method. Watering is then an easy matter, and the seedlings, when large enough, can be transferred to the open ground or potted as required—it is a saving of space and a saving in labor, especially when the seedlings are transferred to frames and to their permanent quarters.

The seeds of many plants may be safely sown at almost any time of the year. The majority of herbaceous plants should be sown during the late Summer, as they occupy comparatively little space throughout the Winter months, and numerous species will bloom the succeeding year, especially if the plants be put in their permanent positions in the Fall, which has been found a very advisable thing to do. Seeds of herbaceous plants, sown early in Spring, especially by amateurs, do not help in making those plants popular, as the seedlings in the majority of cases do not flower the first year, and some of the species not even during the second season.

GRAFTAGE. Graftage consists of placing together two separate parts of plants so that they will unite and grow as one. That part on which the graft is placed is usually a plant provided with roots, and is called the *stock*. The graft, or *cion*, is the part which is intended to develop into the future part of the tree, shrub, or vine, as the case may be, which will bear leaves, flowers and fruits. When the union has taken place, both stock and cion continue developing as one plant, with, in most instances, very little to indicate that stock and cion, or roots and branches, belong to different species, varieties, or forms. Grafting is, however, frequently done upon the branches of trees, shrubs or even herbaceous plants, so that frequently we may see several varieties in flower together, or earlier or later as the case may be, with the flowers of the species, or variety, upon which the grafts are growing.

Some of the reasons why grafting is resorted to as a means of propagating certain species, but principally varieties and forms, in preference to other methods of propagation, are as follows: In

growing seedling fruit trees it often requires a long number of years to know whether these seedlings are worth perpetuating, as seedlings are apt to be a long time in fruiting, partly owing to their robust growth; but every species of plant raised from seed takes a certain time before the flowering and fruiting stage is reached. When old enough to give wood for cions, the seedlings which we will suppose to be the results of cross-fertilization are grafted on older seedlings, or fruit-bearing stocks, with the result that flowering and fruiting are hastened very considerably. When it is desired to propagate a large number of any selected variety that has thus been flowered and fruited, the grafts are often used on one- or two-year-old seedling stocks. It will thus be seen that a very large number of slow flowering and fruiting plants can be raised by this method, in a comparatively short time. But the uses to which it is put by no means end here. Some flowering shrubs have the same characteristics; they take quite a long while to flower from the seedling stage. Very often seedlings do not make floriferous plants, and many of the forms do not produce seeds at all. Therefore, recourse is had to grafting or budding, not only to lessen as much as possible the time between the periods of propagation and flowering, but also to perpetuate certain peculiarities in species and varieties which cannot be brought about by seeds or cuttings. Frequently the stock has beneficial influences upon the cion. One of them is that some things which are comparatively tender are rendered hardier by being grafted upon the stocks of hardy species or their varieties. In order to make fruit trees dwarf, such as Apples and Pears, certain well-known stocks are used for this purpose, such as Paradise and Doucin stocks for Apples and Quince for Pears.

For outdoor grafting the usual time is in the Spring, just before the plants are in active growth, the actual time varying, of course, with different plants and in different parts of the country. The cions are cut in early Winter, and buried in the soil or sand, just out of the reach of frost. This keeps them fresh and plump, and in a condition to readily unite with the stock.

The methods of grafting are numerous; some of them are quite complicated and have been originated merely to show the skill of some operator. The easiest way may be said to be the best, and the best methods are so easy that an intelligent child may be taught in a short time to perform the work successfully. Indoor grafting is practiced during August and September, and, with dormant wood, during the period from December to March. As a rule, the closer the relationship between stock and cion the greater the chances of

a successful union between them. But plants are sometimes successfully grafted on stocks of different genera of the same order. The *Syringa* on the *Ligustrum* is a familiar example.

Cleft Grafting. This method of grafting is used principally upon large stocks which are cut off perfectly level. With a grafting tool, a large knife or cleaver, the stock is split. The cions about three eyes long are then cut in the form of a perfectly even-sided wedge at the base and cut off the top just above a bud. The cleft is opened and the cions are inserted, one on each side. Be sure, in all grafting, that the layers between the bark and wood of both stock and cion are in contact.

Wax all cut surfaces with a grafting wax, which may be made by melting together 4 parts of resin, 2 parts of beeswax and 1 part of beef tallow. When thoroughly melted pour in a pail of cold water and as it cools gradually pull it like molasses candy until it becomes the color of Manila paper.

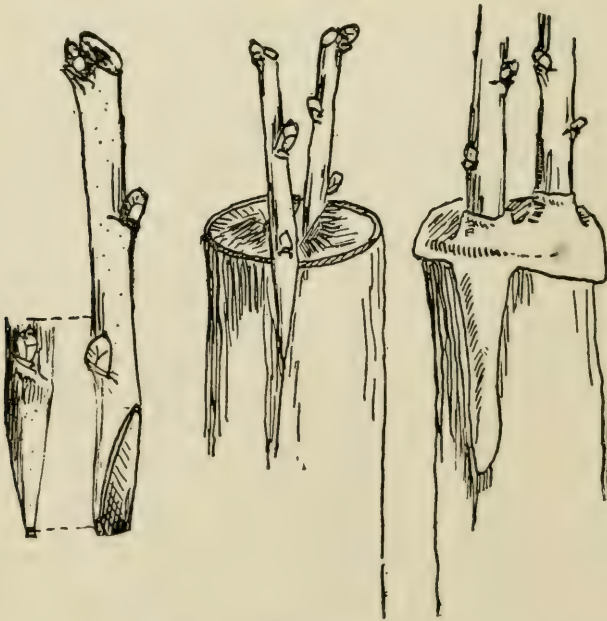


FIG. 4—CLEFT GRAFTING

The above illustration shows in detail how cleft grafting is performed—usually on large Apple and Pear trees. On the left are the cions with tapering cut; on the right, the branches cleft or opened, also showing the waxing over. Cleft grafting is usually performed just before the trees start into growth in the Spring. To be sure that the cions used are dormant, they are usually collected in late Winter and stored in damp sand or sawdust.

Tongue or whip grafting is used with seedlings as stocks, the stock and cion being of the same thickness. The stock is cut off with a long slant, the cion is prepared in the same manner. A longitudinal cut is made in each so that when the cuts are opened the stock and cion will fit exactly in their places. A little practice will show where the tongues should be made. The graft should be wrapped with waxed string, which is made by soaking a ball of No. 18 knitting cotton in grafting wax. This method is employed especially upon roots of seedling fruits and upon the more slender twigs of trees.

Saddle grafting. In this case that part of the stock on which the cion is to be placed is cut to a wedge shape. A neatly made notch is cut in the bottom part of the wood of the cion to fit closely over the wedge-shaped part of the stock. Tie the stock firmly with waxed string. This method is used in grafting Rhododendrons.

Crown grafting is performed by heading back a large-sized stock, making an incision in the bark from the severed part downward. Raise the bark on each side of the perpendicular cut, as in budding; make a slanting cut on one side of the cion, and insert beneath the bark; bind together and cover with grafting wax.

Veneer grafting is principally practiced on coniferous plants and Rhododendrons. It consists of making a cross cut through the bark and slightly into the wood. A short distance above this cross cut begin with a slanting cut downward until the first cut is reached; shape the cion so that it fits exactly; tie in position and cover with wax. The stock is headed back after the union has taken place.

Inarching consists of uniting the cion to the stock while it is still supported by the parent root. It is the simplest of all the

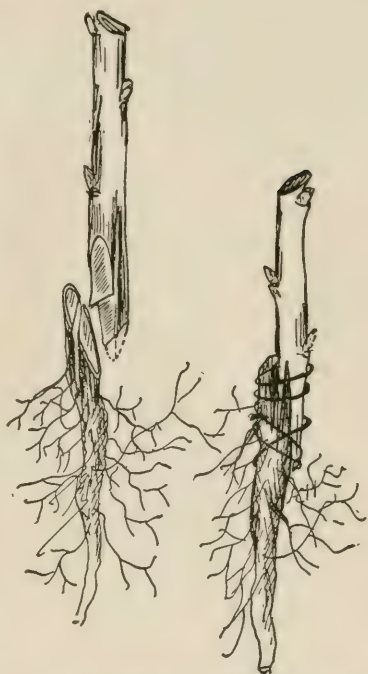


FIG. 5—WHIP OR TONGUE GRAFTING
In grafting the stock and cion must be firmly bound around with broad raffia or other ligature. The above drawing is intended to show how to fix the graft, but the binding must cover the union thoroughly to exclude the air.

methods. A slice of bark and cambium is cut from both stock and cion, the two brought together so as to fit exactly; they are then firmly tied. After the union is assured the cion is gradually severed from the parent to avoid a too sudden check.

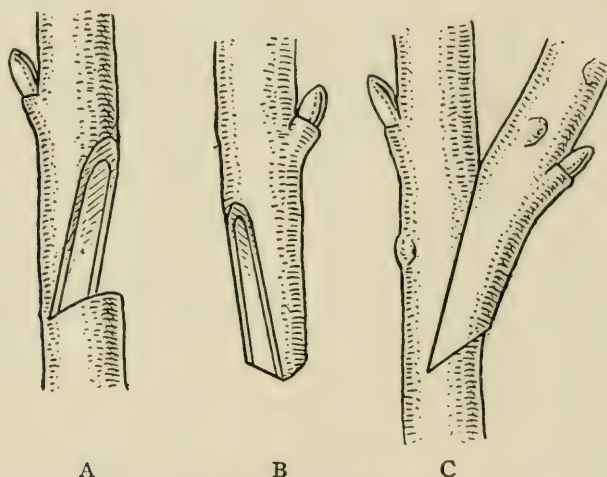


FIG. 6—VENEER GRAFTING
A, The stock notched. B, The cion cut to fit the stock.
C, Stock and cion together.

Root grafting is a very simple operation, and is practiced with such plants as Clematis, Rose, Shrubby Pæony, and many other plants. When all other stock fails this may be tried, merely selecting roots of the same or allied species. The Shrubby Pæonies are grafted on the large tuber-like roots of the herbaceous species. A notch is made in the side of the swollen tuber-like root, the lower part of the cion being made to fit this.

With Roses and Clematis splice grafting will answer; with Wistarias and Bignonias saddle grafting is preferred.

In grafting, a very sharp and clean knife should be used, to make a clean cut, so that the surfaces may go closely together. In all cases the bark of both stock and cion should come evenly together, at least on one side, and on both if possible.

BUDDING differs from grafting in that only a single bud is used on the stock instead of a piece of branch on which there are one or more buds, as in grafting. A near relationship must exist between the plant from which the bud is selected and the plant which is to receive it. The operation is a trifle more delicate than that of

grafting, but a little practice will render it an easy task. The best time for the work is after the plants have completed most of their growth, but before they approach the dormant stage. When done during the late Summer, all that is necessary to accomplish the first season is to secure a union. The bud remains dormant until the following Spring. There are several methods; that most commonly practiced, *shield budding*, consists of making a cross cut through the bark of the stem of the stock. It should never be greater than for one-third of the circumference. From the center of the cross cut make a longitudinal cut downward; raise the bark sufficiently in the angles of the cut parts; this is best accomplished with a finely prepared quill. The stock is now ready for the reception of the bud; this is taken usually from a branch smaller in circumference than the stock. It must necessarily be from the current year's wood, and the bud should be from the central part of the shoot. Cut the leaf away, but not too near the bud, and with a sharp, clean knife slice the bud from the shoot. It is immaterial if a little of the wood be taken with the bark, but the length of bark should be greater below the bud than above. The top part should be cut off transversely one-third of an inch above the bud and double that distance below. After the bud has been placed in position, tie moderately firm with raffia, examining it from time to time to prevent the raffia from cutting into the bark. Budding is usually performed during the latter part of Summer.

LAYERING. This operation is on the same principle as that of mossing Rubber plants and Crotons, that is, producing roots on the branches while yet attached to the parent plant. It is exceedingly simple when done correctly, but some of the little details left out, or performed the wrong way, will render the operation unsuccessful. An expert, with shrubs amenable to this method of increase, will seldom lose a layer. Briefly stated, the operation consists of bending a branch low enough so that after it has been notched, tongued or ringed, as the case may be, the part so treated should be several inches beneath the surface of the soil, so as to throw out roots, while being at the same time supplied with nourishment from the parent plant. It is a convenient method of rooting large pieces of a bush, and should be practiced where small quantities of certain things are desired, especially those which are difficult to increase by other methods of propagation. In layering it is necessary to select branches near the ground, so that they can be bent down without breaking. To perform the operation by tonguing, with a

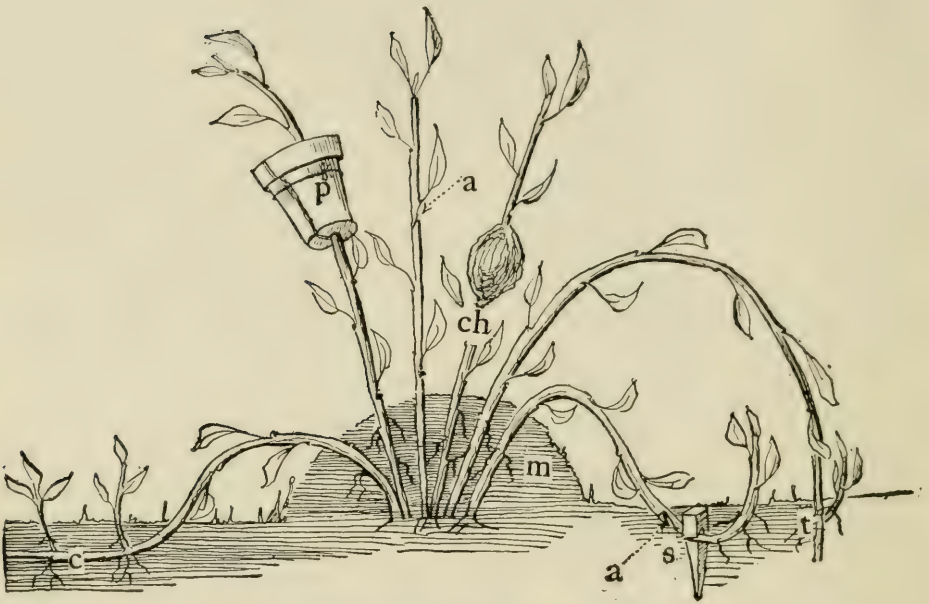


FIG. 7—DIAGRAM OF LAYERS OF VARIOUS SORTS

a, A diagonal cut in the stem which induces roots to be sent out. c, A continuous layer, each node produces a plant, ex. grapes. ch, Chinese layer. The stock is prepared as in a, and covered by sphagnum moss. m, Mound layers—note root action. p, Another method of Chinese layering. A pot is used, broken in two and tied about the branch. s, Simple layer. A branch is pegged to the soil after having a cut made at a where the roots should start. t, Tip layer. Used successfully with Raspberries.

sharp knife make an incision in the lower part of the branch at the place where it is desired to have the roots. The incision should vary in length and depth with the thickness of the branch; it should never be deeper than half the thickness of the wood, and should be made toward the end of the branch so that the tongue will eventually form the base of the stem after being separated from the parent plant. The layer, while undergoing the process of rooting, should be held in place with a peg, which must be strong enough to last several months in the ground. With few exceptions shrubs and vines are layered during Summer while the plants are in active growth. In layering, it should be kept in mind that the soil surrounding the part from which roots are desired should never be allowed to get dust dry; to prevent this a little sphagnum moss should be placed around the cut part, in cases where the rooting is a slow process; and a layer of moss, or other material, on the surface of the soil will prevent a too rapid evaporation of moisture. But in any

case, copious waterings during dry weather will be found beneficial. In the treatment of vines, such plants as *Glycine sinensis* and *Pueraria Thunbergiana* can be layered the entire length of the previous season's growth, thus giving a plant at every point. The period at which the layer may be severed from the parent must be governed by the quantity of roots made. Better to keep it on the plant than to sever too early. After a season has elapsed the majority will have rooted, if attention has been given; but it will not hurt to let them stay for a longer period attached to the old plant. For furnishing suitable wood for layers, old plants are sometimes cut down quite close to the ground, in order to produce a quantity of young growth. Plants so treated are termed "stools." Some of the plants which layer easily are *Rhododendron*, *Enkianthus*, *Gordonia*, *Magnolia*, especially the Asiatic species and their hybrid variations, *Syringa*, *Forsythia*, *Ligustrum* and the Hybrid Perpetual Roses.



CHAPTER III

Scientific Names

Why Botanical Names are Used. The question is often asked by the amateur, why scientific, or botanical names are used. There are several good reasons for this: (1) The names are in Latin, a dead and unchanging language, so that the words are the same for all time. (2) Latin is used as the international language for science; in other words, the gardener in China, Argentina, or the United States knows exactly the plant meant when the words *Solanum tuberosum* is mentioned, but we in the United States call it a *potato*, in France it is *pomme de terre*, in Germany it is *kartoffel*, in Spain it is *patata*, and in each country a local name is applied. Botanical names are the Esperanto of science. Even in our country the name Dusty Miller is applied to a number of different plants. (3) Scientific names are convenient because they are of two parts, the genus and the species; by knowing the word *Prunus*, the genus, we know that the stone fruits, Peaches, Plums, Almonds, Apricots, Cherries and others, are all allied. These different kinds of *Prunus* are thus given, respectively, such specific names as *Prunus Persica*, *P. domestica*, *P. communis*, *P. Armeniaca* and *P. Cerasus*.

Latin Names and What some of them Mean. The botanical name of a plant is made up of two parts—the generic name or name common to the group, and the specific name or particular species of that genus. The specific name is often descriptive of a characteristic of the plant, ex., *Salvia azurea*; *Salvia* is the genus, and *azurea* is descriptive of it; in other words, *Salvia azurea* is the Blue Salvia. Many times the species name is given to honor some person, ex., *Aconitum Wilsonii*; the name of the species *Wilsonii* is merely the Latin form of Wilson. Some species are named from the geographical location in which they are found, ex., *Primula chinensis*, *Fragaria virginiana*. The species name, when an adjective, usually agrees with the genus name in gender. Thus the adjective *albus* has the masculine form *albus* with a genus such as *Dictamnus*, *albus*; the feminine form *Carya alba*, and the neuter form *Geum album*. Most trees are feminine whatever their termination; therefore, the name of the White Oak is *Quercus alba*, even though the termination



AQUILEGIAS.—See page 172

These charming perennials, also known as Columbine, are easily grown in the garden where they cross one with another so that natural hybrids are often most interesting.

of the genus-name is *us*. Species-names derived from persons end in *i*, as *Fischeri*, but if the person's name ends in a hard consonant the ending is *ii*—*Scottii*, *Wilsonii*, *Davisii*, *Veitchii*. Often the person's name is in the possessive as *Iris Douglassiana*. Certain old genus names or proper names when used as species-names are capitalized, for example, *Begonia Rex*, *Inula Helenium*. Other species names are not capitalized.

The list which follows is adapted from Bailey's "Cyclopedia of Horticulture." For a more complete list the reader should consult that work. The list includes mostly descriptive species-names.

SPECIES NAMES OF PLANTS

<i>abortivus</i> , parts failing to develop	<i>cæruleus</i> , dark blue
<i>acaulis</i> , stemless	<i>cæsius</i> , bluish gray
<i>acuminatus</i> , long-pointed, tapering	<i>callosus</i> , thick skinned
<i>acutilobus</i> , sharply lobed	<i>campanulatus</i> , bell-shaped
<i>æstivalis</i> , summer	<i>candicans</i> , white wooly
<i>affinis</i> , related to another species	<i>carneus</i> , flesh colored
<i>alatus</i> , winged	<i>caudatus</i> , tailed
<i>albicans</i> , whitish	<i>chryso-</i> , golden; ex., <i>chrysophylla</i> ,
<i>albus</i> , white	golden leaved
<i>alpestris</i> , alpine	<i>coccineus</i> , scarlet
<i>altus</i> , tall	<i>communis</i> , common
<i>amabilis</i> , lovely	<i>concolor</i> , colored similarly
<i>anceps</i> , two edged, two headed	<i>cordatus</i> , heart shaped
<i>angustus</i> , narrow	<i>cruentus</i> , bloody
<i>annuus</i> , annual	<i>cuneatus</i> , wedge shaped
<i>apetalus</i> , without petals	<i>cuspidatus</i> , sharp, stiff point
<i>aphyllus</i> , without leaves	<i>dimorphus</i> , two forms
<i>arborescens</i> , somewhat tree like,	<i>dioicus</i> , diœcious, each sex on
woody	separate plant
<i>argenteus</i> , silvery	<i>divaricatus</i> , spreading
<i>arvensis</i> , pertaining to cultivated	<i>domestis</i> cultivated
fields	<i>echin-</i> , spiny; ex., <i>echinocarpus</i> ,
<i>asper</i> , rough	prickly fruited
<i>atro-</i> , dark; ex., <i>atrococcineus</i> ,	<i>edulis</i> , edible
dark scarlet	<i>elegans</i> , elegant
<i>aureus</i> , golden	<i>ensiformis</i> , sword shaped
<i>australis</i> , southern	<i>exaltatus</i> , very tall
<i>azureus</i> , light blue, azure	<i>ferox</i> , very thorny
<i>baccatus</i> , berried	<i>festivus</i> , gay
<i>barbatus</i> , barbed, bearded	<i>filifera</i> , bearing threads
<i>bicolor</i> , two colored	<i>flore-pleno</i> , double flowered
<i>biennis</i> , living two years only	<i>floribunda</i> , free blooming
<i>bifidus</i> , cut twice	<i>formosus</i> , beautiful
<i>blandus</i> , mild, bland	<i>fragrans</i> , fragrant
<i>bonus</i> , good	<i>frutescens</i> , shrubby
<i>borealis</i> , northern	<i>gibbus</i> , swollen on one side
<i>botryoides</i> , grapelike	<i>glaber</i> , smooth
<i>brevis</i> , short	<i>glaucus</i> , grayish

glomeratus, clustered
gracilis, slender
grandis, large
hetero-, various; ex., *heterophylla*,
 leaves of various shapes
hirtus, hairy
hortensis, garden form
humilis, dwarf
hybridus, hybrid
igneus, fiery
ilicifolius, holly like leaves
incanus, hoary
incisus, cut
insignis, remarkable
lævis, smooth
latifolius, broad leaved
lepto-, thin; ex., *leptophyllus*, thin
 leaved
luridus, pale, sallow
lutescens, yellowish
macra-, large; ex., *macranthus*,
 large flowered
maculatus, spotted
magnificus, distinguished
majalis, of May
major, large
maximus, large
micro-, small; ex., *microphylla*,
 small leaved
minus, smaller
mollis, soft, soft hairy
mono-, one; ex., *monophylla*, one
 leaved
multi-, many; ex., *multijugus*,
 many times joined
muralis, growing on walls
nanus, dwarf
natans, floating
nemoralis, of the woods
nidus, nest
niger, black
nitidus, shining
nivalis, snowy
nobilis, famous
nudi-, nude; ex., *nudicaulis*, naked
 stem
officinalis, medicinal
ornatus, adorned
pallidus, pale
palmatius, shape of hand

palustris, march loving
panduratus, fiddle shaped
parvi-, small; ex., *parvi-coronati*,
 small crown or trumpet
patens, spreading
peltatus, attached at center
pinnatus, leaflets placed on each
 side, opposite of *palmatius*
platy-, broad; ex., *platyphyllus*,
 broad leaved
plicatus, folded lengthwise
plumarius, plumed, feathery
poly-, many; ex., *polyanthus*, many
 flowers
præcox, very early
pratensis, of the meadows
pseudo-, not genuine; ex., *pseudo-*
tsuga, false Tsuga
pubescens, downy
pulcher, handsome
pumilis, dwarf
punctatus, dotted
pungens, sharp pointed
racemosus, flowers in long continu-
 ous clusters
radicans, rooting
repens, creeping
sativus, cultivated
scaber, rough
schiz-, cut; ex., *schizophyllus*, cut
 leaved
sempervirens, evergreen
speciosus, good looking
squalens, dirty
suaveolens, sweet scented
tenax, strong
tenui-, slender; ex., *tenuifolia*,
 slender leaved
uliginosus, prefers wet places
undulatus, wavy
urens, burning, stinging
utilis, useful
variabilis, many forms
vernus, of Spring
versicolor, variously colored
villosus, soft hairy
virens, green
viridus, green
vulgaris, common
xanthinus, yellow



FIG. 8—SECTION OF TYPICAL FLOWER

P, Petal, all the petals taken together is the corolla. S, Sepal, the sepals taken together is the calyx. ST, Stamen, the male part of the flower; AN, the pollen producing part or anther; FI, the filament or thread-like portion. PI, Pistil, the female part of the flower. STI, its sticky stigma which receives the pollen; O, the ovary which bears the seeds. R, Receptacle, a portion often making part of a fruit. (See page 39).



FIG. 9—PEA BLOSSOM

Note that all the stamens, except one, are united together.



FIG. 10—TOMATO BLOSSOM

Note the ring of stamens surrounding the pistil. (See page 40).

CHAPTER IV

Hybridization of Plants

Several years ago there was much discussion of the use of the words *hybrid* and *cross*. The writers now use these words interchangeably. A hybrid is a cross between two plants which differ in one or more characteristics. As all plants differ, a hybrid is the result of any cross. Formerly, hybridity meant weakness, but now we have come to see that hybrids often surpass the parents in vigor and quality.

In order to cross plants successfully one must intimately study their structure. We must distinguish the male and female parts and their relative time of ripening. It is true that all flowers are essentially the same. A perfect flower has both male and female parts in the same flower. The male portions are the stamens; they bear the pollen. The female portion is known as the pistil; it usually has a sticky or feathery head so that pollen once lodging there may remain. At the base of the pistil is the ovary, or more properly called the ovulary; its function is to bear the seeds. Besides these essential parts of the flower there may also be found showy petals and leaf-like sepals, but they are non-essentials. (See Fig. 8).

In the Rose, there are many stamens prominently filling the center of the flower; tucked in among them at the very center is the small bunch of pistils. To form seed it is necessary for pollen grains to fall on the pistils. Each ovule in the ovary is waiting for a pollen grain in order that it may produce a seed. In the Poppy and Orchid capsules are thousands of seeds, each of which resulted from the growth of a pollen grain placed upon the pistil. In Corn the stamens are the tassels, the pistils are the silks. Any silk which fails to receive a pollen grain also fails to produce a kernel of corn; a blank in the ear results.

There is a large group of Daisy like flowers, for example, the Lettuce, Zinnia, China Aster and Chrysanthemum. In these plants what appears to be a flower is really a bunch of small flowers. Flowers in the outer row are usually larger and more showy, while

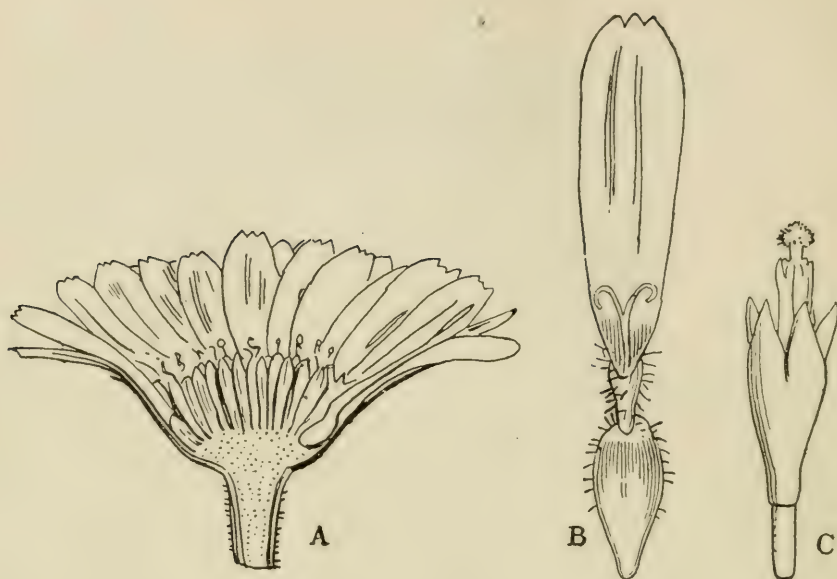


FIG. 11—DAISY LIKE FLOWER

A, Flower of *Calendula*; note disc florets, or tubular flowers at center and ray florets, or showy flowers around, the outside. B, A ray floret; note the stigma of the pistil. C, A disc floret; note the five-parted corolla, the ring of stamens at center surrounding the pistil.

the inner row is made up of tubular flowers. They ripen at different times and shed their pollen on each other.

Insects and the wind usually carry the pollen from one flower to the next, but there are some flowers which shed their pollen upon their own pistil. This sort of flower is said to be self-fertilized or close-pollinated. The Peas and Beans are examples.

In hybridizing work the object is usually to cross two sorts of plants for the improvement of one or the other in some way. Let us suppose we are to cross a Tomato. The Tomato flower is a perfect flower; the stamens are found in a ring about the pistil at the center. In order to get a hybrid between two varieties, say the Stone and Earliana, we will use Stone as the female parent—in other words, we expect the Stone to bear the fruit, but will take the pollen from the Earliana. Just before the flower of the Stone opens in the early morning we should use a small forceps or a needle to forcibly open the flower and remove its stamens. This is emasculation. We are eliminating the male part. The pistil must not be injured. After this we will place a bag over the flower so that no other pollen may lodge upon the flower. Should a bee bring pollen to our flower it



FIG. 12—CROSSING TECHNIQUE OF GLADIOLUS

A small vial is secured to the thumb of the left hand by means of a rubber band; the fingers are thus left free to hold the flower. With the right hand the stamens are easily removed by the use of forceps, and dropped into the vial.—*From Cornell Extension Bulletin No. 10*



FIG. 13—SQUASH BLOSSOM. A, FEMALE FLOWER.
B, MALE FLOWER.

might produce seed but it would not be a cross between the two varieties we wish. At noon the bag is removed and the flower examined with a lens. If the tip of the pistil looks sticky, pollen from the Earliana may be placed upon it, otherwise we would wait until the pistil becomes sticky. The pollen may be transferred by a camel's hair brush or the stamen of Earliana may be picked and carried to the emasculated flower. After covering the tip of the stigma with pollen the bag is again placed on the flower and a tag is attached to the stem noting the fact that the flower has been crossed with Earliana. (See Fig. 10.)

All crossing is a modification of this method. Some flowers are easier to emasculate than the Tomato and others are more difficult. For easy work cross the Gladiolus or the Petunia; their sexual organs are very distinct. The stronger parent is usually employed as the seed bearer. Some flowers, as the Carnation, will require one week after emasculation before pollination may be carried on.

In Cucumbers, Squashes, Pumpkins and like plants each flower bears only one sex. The female flower (see fig. 13-A) has an embryo Squash beneath it—it has no stamens; the male flower (fig. 13-B) has no ovary. It is necessary, therefore, that a bee carry the pollen from the male to the female flower, otherwise no seed is formed.

Saving Seed from Desirable Plants

In saving seed for propagating superior plants the characteristics of the whole plant should be considered.

Let us speak of the Tomato again. Should you care to save seed of a plant, bear in mind that vigor of growth, quality of fruit and productiveness are essential features. Be careful, therefore, to choose the plant which bears well-developed fruit and is a good yielder as well. Large Tomatoes are often found on plants bearing few fruits; consequently, they are not the most desirable to select for seed purposes. Tomatoes for seed must be allowed to thoroughly ripen. All seeds should remain on the plants until ripe, but must be picked before they scatter their seeds.

In saving seed of Primroses, Cyclamens, Pinks and other flowers it is better to cross the flowers with others on the same plant if one wishes to keep the sorts as true as they were. Saving seeds from desirable plants is quite different from hybridizing plants; in the former case we are attempting to keep the variety true, in the latter we are expecting something new and different.

CHAPTER V

Plant Enemies

There never was a cure like a prevention. As a preventive against insects and diseases avoid localities favorable to disease, burn all affected stock, rotate crops, keep down weeds which harbor insects or diseases, refrain from planting affected stock and have preventive remedies at hand.

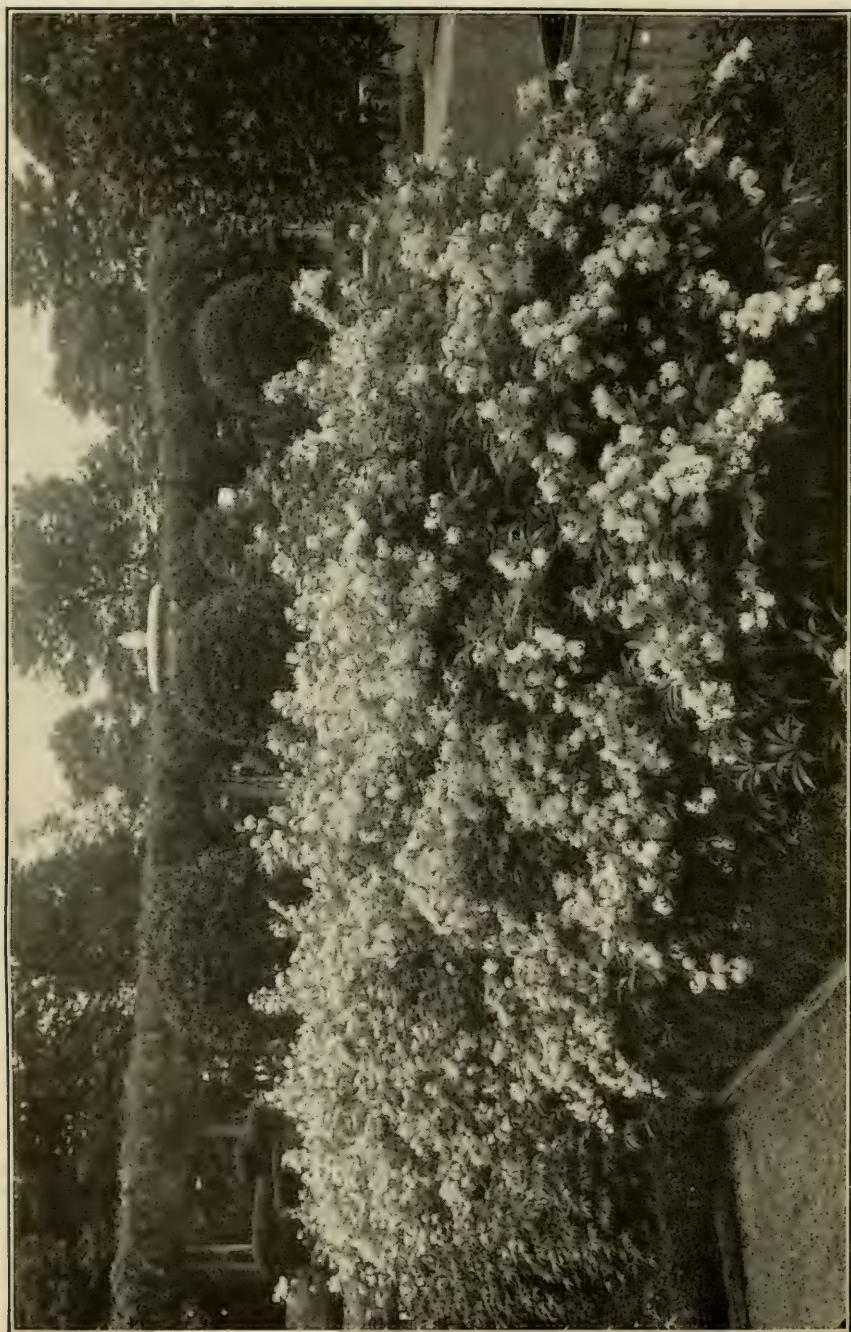
DISEASES

"Whenever the normal functions of plants are interfered with, the plant is diseased," says Dr. Freeman of the University of Minnesota. But many of the garden troubles are not true diseases. Plants become yellow because they are getting too much water or too little, or, perhaps, their roots are affected by some insect, or perhaps the soil is too poor or too rich. Real diseases are caused by certain fungi and germs. They affect parts of plants and may be prevented from spreading, but the affected parts cannot be cured. There is very little real information available for the control of plant diseases; each disease on each plant requires special treatments at special times. The control of plant diseases usually depends upon the use of copper or sulphur in some form.

FUNGICIDES. The following will be found helpful in controlling many of the destructive plant diseases:

A. Bordeaux Mixture. This is the most effective remedy for many leaf spots and rusts. It discolors the foliage and, therefore, cannot be used in many cases. The ingredients are, 4 pounds of copper sulphate (blue vitriol), 4 pounds of quick or unslaked lime, and 50 gallons of water. Both the copper sulphate and the lime must be in solution before the two substances are mixed together; in other words, only dilute solutions must be mixed together, otherwise the mixture will not be proper and will injure the plants.

For smaller amounts, Peltier gives these directions: "A stock solution of copper sulphate is made by dissolving one pound of



DEUTZIA GRACILIS.—(See page 308)

This *Deutzia* is one of the most attractive shrubs to use in front of the taller ones. The flowers are white and graceful.

copper sulphate in one gallon of water. A stock solution of quick-lime is made by weighing out a definite quantity and slaking it with a small quantity of water. After the lime is thoroughly slaked and cooled, enough water is added to make a solution containing one pound of lime per gallon of water. These solutions, if kept in covered vessels to prevent evaporation, will remain good for a long time. In preparing the Bordeaux mixture from stock, measure out the proper quantity of your solution of copper sulphate and dilute it with half the quantity of water needed. In a similar manner measure the lime from stock, and dilute with the other half of the water, but in separate vessels, and mix as outlined above."

B. Ammoniacal Copper Carbonate. Dissolve 6 ounces of copper carbonate in about 3 pints of ammonia, but use no more ammonia than is necessary for the solution. Add 50 gallons of water. The solution without the water will keep some time if bottled up. It does not discolor the foliage. It is effective against black spot of Roses, leaf spots and some rusts.

C. Potassium Sulphide. Use 3 ounces of potassium sulphide to 8 or 10 gallons of water. Good for mildews and rusts in the greenhouse and out of doors for Gooseberry mildew.

D. Sulphur, Powdered, or Flowers of Sulphur. Used with a powder gun or placed in cheese-cloth bags and dusted on foliage while dew is on the plants. In the greenhouse, a paste should be made of sulphur and water with a quarter part of lime and smeared on steam pipes. Effective against mildews, especially Rose mildew and Asparagus rust. In Summer, in the greenhouse, when the steam is not on, sulphur vaporizers are useful, but they must be used carefully.

E. Lime and Sulphur Solution. In making this spray at home any amount may be made, using the standard proportions, 10 pounds of stone lime, 10 pounds of flowers of sulphur with enough water to make 50 gallons of solution. Place the lime in a wooden receptacle and add enough water to start the slaking, then add the sulphur, stirring it in thoroughly. It is ready for use after adding the required water. Commercial lime-sulphur solutions can be now obtained which require no preparation except adding water. Lime and sulphur is effective for a Winter spray controlling scale insects and Peach-leaf curl; as a Summer spray for diseases of fruit. The commercial preparations usually require 7 gallons of water for each gallon of stock solution when used as a Winter spray, but

each gallon of the stock preparation must be diluted with 40 gallons of water when used upon trees in leaf.

F. Formalin Solution. Dr. W. E. Britton advises:

- a. 1 pint (1 pound) formalin to 50 gallons of water for grain smut.
- b. 1 pint formalin to 30 gallons of water for Potato scab. Soak for 2 hours.
- c. 1 pint formalin in $12\frac{1}{2}$ gallons of water for sterilizing soil for damping-off fungus. Use $\frac{2}{3}$ -1 gallon for each square foot surface treated. Cover for 24 hours after treating; air afterward and stir soil; allow 7-10 days before seeding or 10-14 days before transplanting.

G. Corrosive Sublimate. 1 part to 1000 parts of water, is one of the best disinfectants. It is used 2 ounces to 15 gallons of water for Potato scab. Soak seed Potatoes in this 2 hours before cutting. Use wooden vessels.

INSECTS

Most of the miserable "bugs," so-called, are of two sorts—those which eat the leaves and those which merely puncture the leaf to suck out the juice. The gardener should become more familiar with the ways of the insects, for some are valuable and should be admired. Those who have read Sir John Lubbock, Faber or Maeterlinck realize that the insect world is quite as romantic as our own.



FIG. 14

A sucking insect—note the formidable beak, used to pierce plants and extract juices.

Head of biting insect—note jaws, large compound eyes, and the feelers near jaws and eyes.

Root Insects. Some of these insects are found on the roots, in which case the plants affected are thought to be diseased. Some of these insects actually chew the roots, while others suck out the sap.

Borers. There is a group of insects which burrow into the stalks, the bark and solid wood of branches, and even the trunks of trees. The fruit trees are especially attacked by these borers. Peaches, Apples, Currants, Gooseberries, Raspberries, Blackberries, Roses, China Asters, Squashes and many other plants are so affected. They must be dug out. It is difficult to apply an insecticide effective against borers after they get into the plants. Spray the trunks with kerosene emulsion and a caustic solution of soap, caustic potash and carbolic acid. Tarred paper or wire protectors will also keep the insects from laying their eggs. Remove all weeds and suckers and keep clean cultivation.

Leaf, Flower and Bud Insects. Other insects prefer the leaves and buds. This class is the easiest to control. As in medical work, there is no panacea for all ills, but it is not dangerous to make one general sweeping statement about their control. It is this: Sucking insects are seldom controlled by poisonous insecticides; their breathing pores along the sides of their bodies must be hit and filled with the fluid; they are controlled by contact insecticides. Chewing insects greedily eat the leaves which, if covered with a poison, will kill them.

CONTACT INSECTICIDES. The following insecticides are effective against sucking insects:

1. **Tobacco or Nicotine Extracts** are placed first in the list because they are the most effective. Those having the highest percentage of nicotine are the most valuable. Tobacco extracts are found in both liquid and powder form and should be sprayed upon the plants out of doors according to directions for each sort. The addition of some soap to the tobacco solutions will help to make them adhere to the insect. In the greenhouse, plants may be fumigated by tobacco solutions or by burning tobacco dust. By this method the nicotine is more thoroughly applied than by spraying. Nicotine solutions are effective against plant lice or aphids, thrips or any of the softer bodied bugs; the sucking insects.

2. **Soap Solutions** for sprays are not as effective as the tobacco solution and are hardly worthy of use considering the ease of obtaining and the effectiveness of the latter. They are useful for washing scale from plants; for this use fish-oil soap, if possible.

3. **Emulsions** are near solutions of some oil and a soap solution. Good for plant lice and scale insects. As it is difficult to make a perfect emulsion No. 1 has displaced the use of this class of insecticide. Kerosene emulsion consists of: Hard, soft, or fish-oil soap, quarter pound; water, 2 quarts; kerosene, 1 gallon. Dissolve soap in hot water; while still hot but removed from fire add kerosene and pump back and forth till it becomes a creamy mass. If made properly the solution will not separate upon cooling. When using, dilute with 10 to 15 parts water.

4. **Pyrethrum** is the dried and powdered flowers of a certain Chrysanthemum, and is useful against thrips and plant lice. As a dust it is applied while foliage is moist. Pyrethrum is used in solution at the rate of 1 ounce to 3 gallons of water, mixed a day before using.

5. **Carbolic Acid Solution.** Fish-oil soap, 8 pounds; crude carbolic acid, 1 gallon; water, 8 gallons. Dissolve soap in hot water, add acid, heat to boiling point 20 minutes. Use 20 gallons water to each gallon of stock solution. This may be used for mealy bugs and soft-bodied insects.

POISONOUS INSECTICIDES. Use for chewing insects, slugs, cut-worms, maggots, caterpillars, and most insects called worms. The most used substance for this type of control is arsenic.

6. **Arsenate of Lead.** This substance is used at various strengths, depending on the plant affected and the insect working, usually 3 pounds of paste or $1\frac{1}{2}$ pounds of powdered arsenate of lead are used to 50 gallons of water. It is now the most used remedy for caterpillars, slugs, maggots and worms feeding upon the foliage of plants.

7. **Paris Green.** Has same use as arsenate of lead, but is not quite so effective.

8. **Hellebore.** This is procured as a powder. It is much less poisonous than arsenical insecticides and is very useful upon ripening fruits, especially for the Currant worm. It is applied when dew is on the plants. For worms on Currant and Gooseberry bushes sprinkle slaked lime very lightly. It is used at the rate of 1 ounce to 2 gallons of water.

9. **Poison Bait.** Slugs and cutworms are easily controlled by distributing a poison bait over the garden or in little piles under the plants. Use wheat bran mixed with a little Paris green or arsenic and some syrup. Mix thoroughly and scatter about just after dark.



SOLANUM CAPSICASTRUM (JERUSALEM CHERRY).—See page 155

10. **Hydrocyanic Acid Gas.** Fatally poisonous. For greenhouse use: 1 ounce potassium cyanide (98 per cent. pure), 1 ounce sulphuric acid, 3 ounces water. Use an earthen dish, pour in water and *add the acid to it*. When all is ready so that the operator can make a hasty exit, drop in the potassium cyanide which is best placed in a paper. Useful for white fly and most greenhouse insects, except red spider and nematode worms. Fumigate on dry, dark nights when it is still, not windy; close ventilators and leave all night. Place danger signs on all doors. The above proportions are used for 3,000 cubic feet of air space on Chrysanthemums, Cinerarias, Azaleas, bulbs, Carnations and other common plants. Ferns and Roses are susceptible to injury; use weaker and then increase strength if there is no injury.

11. Carbon-bisulphide. For weevils in stored grain use $\frac{5}{8}$ pound to 1,000 cubic feet of air in an air-tight bin. Place the carbon-bisulphide in a pan at the top. The gas, being heavy will disseminate through the whole bin. It is sometimes used for root insects and is poured into holes in the soil. Never get the gas near an open flame—it is very inflammable.

12. Combination Sprays. One spraying may suffice for the control of insects and diseases by using 3 pounds of arsenate of lead mixed with the Bordeaux mixture or the lime sulphur solution of 50 gallons.

COMMONER DISEASES AND INSECTS AFFECTING ORNAMENTALS

(The numbers and letters refer to controlling remedies.)

Ants. Use hot water or 11. Ants are thought to spread Peony bud rot.

Aphides. 1, 2, 3.

Aster bug, black. Use soap dissolved in 1.

Black spot. B; very difficult to control.

Borers. Make slit in stems of herbaceous plants to kill the borer.

Bud moth. 6, 12.

Cabbage worm. 6, 7 and after heading use 8.

Carnation rust. In field use A; in greenhouse use C.

Caterpillars. 6, 7, 8, 11.

Currant borer. Cut off cane and burn.

Currant worm. 6 and 8.

Cut worm. 9.

Damping-off. F.

Euonymus scale. Burn infested twigs, spray with 1 in June to kill the young.

Fig-leaf diseases. Use A.

Flea beetles. 6 often effective.

Gooseberry mildew. A.

Grain smut. F.

Hollyhock rust. Use A just as plants come up in Spring.

Lace wing fly on Rhododendron. 2.

Leaf-eating worms. 6, 7, 8, 11.

Leaf spots. A, B.

Lice. 1, 2, 3.

Lilac mildew. C, D.

Maggot. 6, 7 when sweetened used to control the adults; 11 for the larvæ below ground.

Marguerite leaf miner, 1.

Mealy bug. Spray with good pressure; 5 or 10 is also good.

Mildew. C, D.

Millipedes. 9; lime and salt may be used where plants are not injured.

Moles. Trap or use young corn poisoned with strychnine.

Nematodes. Sterilize soil with steam or use fresh, uninfested soil.

Peach-leaf curl. E.

Peony bud rot. Use A just as plants come up in Spring.

Phlox mildew. B, D.

Plant lice. 1, 3.

Potato blight. A, every 10 days.

- Potato bug. 6, 7.
Potato scab. F, G.
Raspberry cane borer. Cut off cane and burn. When pruning in Summer for the branching of the new canes, cut below drooping canes; these should be burned.
Red spider. Spray with water, using force; no insecticide necessary if spraying is done.
Rhododendron lace wing fly. Spray with 1 or 2.
Root lice. Water with 1 or 2, use tobacco stems about the plants; use soot and do not plant the same kind of plants in the infested soil a second season.
Rose black spot. B.
Rose bug. Hand pick into cans of kerosene.
Rose slug. 6.
Rusts. A, B, C.
Scale, in greenhouse, 2; fruit trees, E.
Slugs. 6, 7, 8, 9.
Smut. E.
Snapdragon anthracnose. A.
Sowbug. 9; lime and salt may be scattered where plants are not injured.
Thrips. 1, 4, 10.
Violet leaf spot. In field spray with A; in greenhouse do not allow the atmosphere to become too moist. Destroy infested leaves.
Violet sawfly. 6 or 8.
Weevils in stored grain. 11.
White fly. 10.
White grubs. Fall plow to expose the insects to the cold.



CHAPTER VI

Greenhouse and Conservatory Plants

ABRUS (Prayer Plant). *A. precatorius* succeeds best in the warm house. The plants are prized most because of their pretty seeds, which are very frequently used as beads, although they are poisonous.

Propagation. It is raised from seeds secured from European seedsmen; they may be sown early in the season.

ABUTILON (Flowering Maple). Several of the varieties having ornamental foliage, such as *A. Darwinii tessellatum*, *A. Selovianum marmoratum*, *A. vexillarium* and Eclipse, are good bedding plants. The last two are useful for vases and boxes. All of them have the leaves blotched with yellow. Souvenir de Bonn and *Savitzii* are variegated with white. *A. megapotamicum* is a gem for basket work. The old variety, Boule de Neige, is a rampant growing sort out of doors and might be more largely used in place of the over-abundant Canna. The varieties grown for their flowers are numerous; the colors are pink, red, white and yellow. They are everblooming.

Culture. The cultivation is the same as that for Geraniums and Fuchsias. They make good pot plants if pinched back so that they will branch.

Propagation. Cuttings are rooted in the Fall, or may be taken in early Spring from lifted and cut-back plants. Seeds grow readily; plants started in Spring will bloom in Fall.

ACACIA. *Acacia Riceana* is perhaps the finest greenhouse species for very large plants. *A. pubescens*, *A. Drummondii* and *A. paradoxa* are all good greenhouse species, flowering well on moderate-sized specimens.

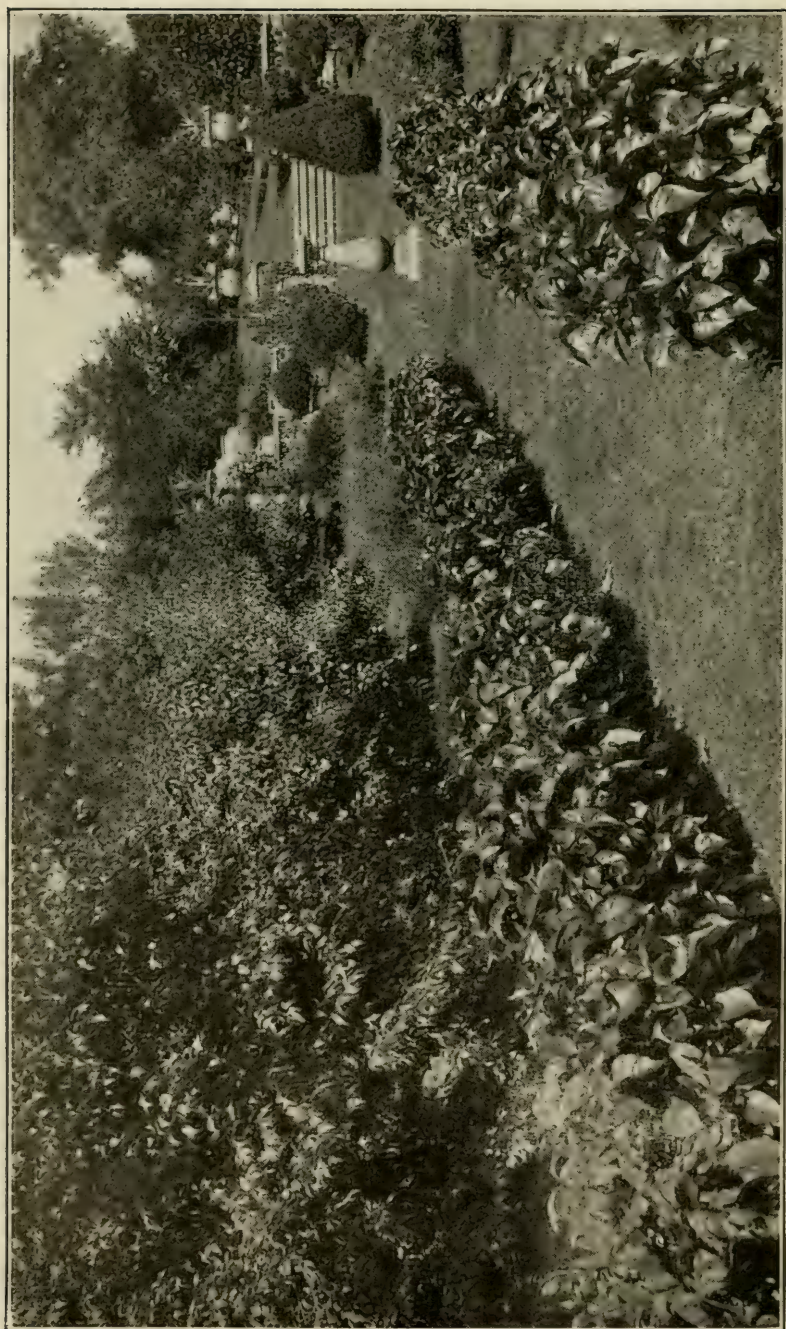
Culture. Sandy loam, to which a goodly quantity of leaf soil or peat is added, will suit them. Firm potting and good drainage are necessary. Plunge the plants outside during Summer, and give liberal supplies of water when the plants are well established.



ABUTILON SAVITZII

They like a cool house best, thriving in a temperature ranging from 40 degrees to 50 degrees, or a little above the freezing point. Wintering cool and allowing to come along naturally in Spring is the best method of flowering.

Propagation. Seedling Acacias are not to be recommended for small flowering plants, on account of their lanky growth. Not only are plants from cuttings most floriferous, but they are easier trained to any desired shape. They should be taken from the half-ripened shoots during the month of June. A peaty soil mixed with half sand should be used, as the roots will take nourishment from it immediately after they are formed. Make the cuttings with a sharp knife and take off the leaves from the part which is to go in the soil with a small pair of sharp scissors. The pots in which the cuttings are rooted should be prepared carefully—rough crocks in the bottom and finer above, until they are filled to within 2 inches of the rim. The remaining space should be filled with finely sifted peat and sand in equal parts topped off with pure sand. Dibble in



AVENUE OF ACALYPHA MUSAICA

the cuttings to the depth of about an inch, but do not crowd. They must be kept "close" during the operation of rooting, and as cool as possible. The pots, which may be plunged in sand, should be covered with a movable glass structure. A good plan is to have two sets of those hand-light or bell-glasses, and instead of wiping the moisture from them daily, remove the wet ones and slip over them those which are dry. After the first watering, the cuttings will take but little more during the process of rooting; when they do require it the foliage should be allowed to dry before putting back the covers.

ACALYPHA. (For further discussion of *Acalypha*, see p. 280.)

Culture. Large plants in pots are speedily produced by using a goodly quantity of bonemeal in the soil. Grow in a high temperature. If tall plants are wanted, keep nipping out the flower spikes as they appear in the axils of the leaves. When the plant reaches the desired height nip out the ends of the shoots; this will cause branching. Mealy bugs are troublesome on *Acalyphas*.

ACANTHOPHŒNIX. *A. crinita* is one of the rarer Palms which will never be very common, because it is a slow-growing species and very sensitive to low temperatures.

Propagation. It is raised from seeds secured from European seedsmen. In a comparatively young stage it is quite attractive.

AGAVE (Century Plant). The Agaves are stiff and coarse plants, standing a great deal of ill-treatment. *A. americana* and its variegated forms, together with several other more or less ornamental species, are much cultivated in pots and tubs. *A. Victorice* *Reginæ* is a dwarf species of small size and one of the prettiest.

Culture. They grow best in rather poor but well-drained soil. The flowering period of adult specimens is hastened by keeping them in a pot-bound state. On the other hand, growth of foliage is accelerated by giving abundant root room.

Propagation. The larger sorts are increased by seeds and offsets, but *A. Victorice* is only propagated by seeds.

ACOCANTHERA (Toxicoplœa). *A. spectabilis* is a Spring blooming stove shrub. Flowers are pure white, borne in dense clusters.

Culture. Should be treated similarly to the *Ixoras*.

Propagation. By cuttings early in the Spring.

ALOCASIA. Although among the most ornamental of stove plants, none of them can be put to much use outside of these structures. Out of a large number of species and forms, *A. metallica*, *A. Regina (Sedenii)*, *A. Thibautiana*, *A. Sanderiana* and *A. macrorrhiza variegata* are well known.

Culture. They do best in good fibrous loam to which one-third of well-rotted cow manure or pulverized sheep manure has been added. Give the pots good drainage and cone up 2 or 3 inches above the rim. The plants must be shaded from the sun at all times, and grown in a minimum temperature of 60 degrees. When active growth starts in March give a temperature of 70 degrees at night, with a humid atmosphere and plenty of water at the roots.

Propagation. The two last named are increased by offsets; the others, by cutting up the succulent stems of old plants. Roll the pieces of stem in powdered charcoal and allow them to dry before placing in damp moss, in a propagating frame, which should have a temperature of 80 degrees. After sprouting put them in a potting mixture similar to that given for *Nepenthes*.

ALOE. Although these plants are usually very coarse they are often popular because of their suggestion of desert conditions. *A. plicatilis* is commonly cultivated as a tub plant.

Culture. The soil best suited to their culture is a sandy loam in which is mixed some broken bricks and some well-decayed manure. Give the plants perfect drainage by using a thick layer of broken crockery in the bottom of the pot.

Propagation. Seeds, suckers and cuttings are all used in multiplying this plant.

AMARYLLIS (See Bulbous Plants).

ANANAS (Pineapple). *Ananas sativus* var. *variegata* is one of the best variegated leaved plants.

Culture. It requires a high temperature indoors. Use a light material for potting, such as sphagnum moss, Fern roots and charcoal. The plants need little water at the roots in Winter; a slight syringing of the foliage is beneficial. In a warm, sheltered place all of the kinds do well out of doors in Summer, where they put on exquisite colorings. If grown large enough the plants will fruit in the same way as the green-leaved forms. In fact, it is best to allow them to fruit, as subsequently they form suckers the more readily.



ANTHERICUM IN 2¼-IN. POTS

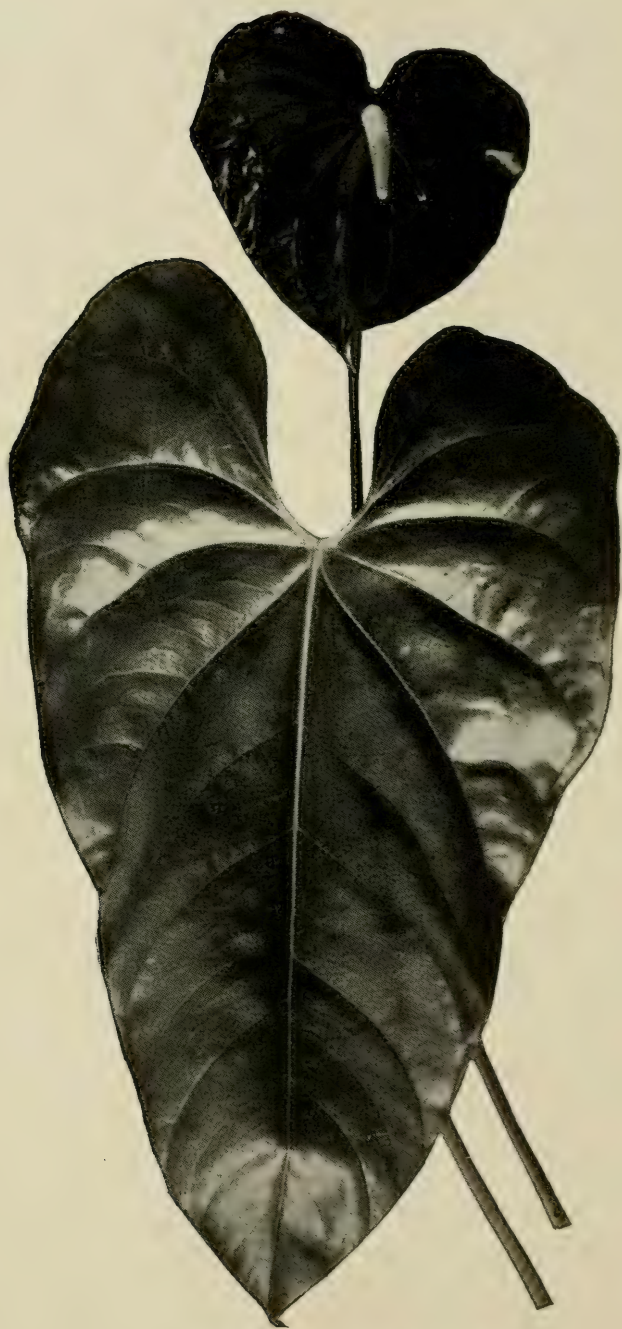
Propagation. The suckers may be rooted in sand, not too moist, but very warm. After being potted and growing a little they will stand full sunlight without injury.

ANTHERICUM (St. Bernard's Lily). *Anthericum Liliago* is a good all-round plant for vases, bedding, or potted for window decoration. For the last-named purpose *A. media picta* is the best variety.

Culture. Large clumps of *A. L.* var. *variegatum*, which have been hibernating under benches, should be broken up about the end of January and potted in 3- and 4-inch pots. They may be placed under benches where the light will strike them for at least a portion of the day.

Propagation. If the plants which were lifted in the Fall are allowed to bloom, and the flower stalks remain on the plants afterward, a good opportunity to increase the stock of plants presents itself during February. All along the flowering stems will be found a crop of small rosettes of leaves which, if cut off, stems and all, and laid on the sand in the shaded part of a warm house, will send out roots in a short time.

ANTHURIUM. The species of this genus are grown either for foliage or flower. None of them has handsome foliage and showy



ANTHURIUM ANDRÆANUM

flowers combined in the same plant. *A. crystallinum*, *A. Veitchii* and *A. Warocqueanum* are very beautiful foliage plants, but the flowers are inconspicuous. On the other hand *A. Andræanum*, *A. ornatum* and their numerous hybrid progeny, together with *A. Scherzerianum* and varieties, have rather ordinary-looking leaves; but in each case the inflorescence is exceedingly attractive. The showy part of the inflorescence is what is termed the spathe, answering the same purpose as calyx and corolla in other flowers. The showy-flowered species are excellent combined with Orchids.

Culture. Their cultivation is simple where a temperature of 65 to 85 degrees may be maintained. Shade at all times, lightest in Winter. The potting mixture should be rough, fibry peat, sphagnum, decayed cow manure and sand, except for *A. Scherzerianum* which needs less sphagnum and more peat. Water should be copiously supplied in the growing season. Toward the end of January, with increasing sun heat, these plants will soon commence active growth for the season. Before this takes place they should be looked over for the purpose of repotting or for rooting any tall or straggling growths which have grown away from the sphagnum in the pot. In this condition the roots, which are formed at the bases of the leaf stems, shrivel up for want of moisture and the plant becomes shy in blooming. Old plants should have the lower part of the stem and roots removed and sunk lower in the pot, using a mixture of fibrous peat, sphagnum, well decomposed cow manure, charcoal and sand. This treatment applies only to such kinds as *A. Andræanum*, *A. ornatum*.

Propagation. Cut off the straggly shoots and put in a mixture of sphagnum and sand in a warm part of the propagating bench; keep moist and roots will form in abundance in about three weeks, when they should be potted up in the usual way. Seedlings can be easily raised, sowing the seeds in the compost above mentioned.

ARALIA. Most of the greenhouse plants known under the name of Aralias belong botanically to the genera, *Polyscias*, *Fatsia*, *Dizygotheca* and *Elæodendron*. The most commonly cultivated species are *Fatsia japonica*, *Dizygotheca elegantissima*, *D. Veitchii*, *Elæodendron Chabrieri*, *D. gracillima*, *D. leptophylla*, *Polyscias monstrosa*, *P. Victoriæ*, *P. plumatum*, *P. Guilfoylei*.

Culture. The Aralias prefer a sandy peat for the finer rooted sorts and a rich compost of loam, leafmold, well decayed manure, charcoal and enough sand to make the soil porous should be used

for the stronger rooted sorts. Shade at all times and maintain a temperature of from 50 to 60 degrees.

Propagation. *D. Veitchii* is readily rooted if the cuttings are taken at the proper time; that is, when young shoots develop on a cut-back plant. They are removed with a heel and kept in a close, warm propagating frame. But this is a slower method than grafting if the necessary stocks are at hand. *P. Guilfoylei*, or any of the woody species of *Polyscias* make good enough stock on which to work them. Select long, wiry wood for cions—that which is not too thick and well ripened. In cutting cions allow a piece of the stem to each leaf. Cut the stock clear across and down to as near the soil as possible; make an incision in it downward for three-quarters of an inch. Make the wood of the cion wedge-shaped to fit the incision, and tie to keep in position till united, during which process they should be kept in a rather warm, humid atmosphere—a moderately warm propagating frame will answer. The leaves of the cions, if too large, should be shortened back a little. March is the best month in which to perform the operation. *Aralia Chabrieri*, so called, strikes so readily from cuttings put in a cool house that there is no necessity for grafting them.

Fatsia japonica is conceded to be one of the best plants for decorative purposes, but like several other worthy plants it is difficult to work up a stock readily, possibly because methods of propagation are not evident. It is rather backward in producing seeds in this country, although moderately large plants flower freely enough. From cuttings, by topping old plants, it is rather slow. It is said to vegetate from pieces of the roots. Seeds are obtainable from some of the European firms at reasonable prices. During March or April the seeds are available and should be sown immediately, as they do not retain their vitality for any great length of time. Firm the soil in the seed pans before sowing, and cover with a mixture of loam and sand; place in a temperature suitable for warm greenhouse plants; shade the plants from the sun. The seedlings, as soon as large enough to handle, should be potted off singly into 2-inch pots, and when in 4-inch pots they should be plunged outside during the Summer in a frame covered with slats, or with sash, tilted top and bottom alternately. When large enough the plants should be shifted, as they suffer from being root-bound. Old plants will stand considerable frost, but the young plants are always more tender and should on the approach of cool weather be given protection.

ARAUCARIA. Most of the plants used in this country (principally *A. excelsa*) were, until recently, imported from Europe. This Araucaria is a native of Norfolk Island and is known as the Norfolk Island Pine. The best place for the plants in Summer is under a structure covered with slats. *A. imbricata*, the Monkey Puzzle Tree, and *A. Bidwillii* are grown out of doors in Southern California.

Culture. Araucarias need cool treatment; the temperature should not be above 60 degrees at night. Do not crowd, and give sufficient light, or they will become ragged. Protect in Summer from the sun.

Propagation. In the propagation of the Araucaria a good plan is to procure seed and sow at the end of the year. The seedlings are not well-furnished with leaves at the base, but they make good stock plants. The ripened tops of the seedlings are so easy to root that, with ordinary care, it is almost impossible to lose a cutting. Moreover, the cut-back plants will immediately begin to throw up good leaders, which in turn are used for cuttings. In taking cuttings from plants which have attained considerable size, the lateral branches may be rooted along with the tops—not for making specimen plants, because this is impossible, but for the purpose of providing material for cuttings; for, when cut back, they will throw up leaders, which are as good as the best. The soil for propagating should be sandy, and pressed firmly about the base of the cuttings, which should be kept in a frame shaded from sunlight, with enough moisture in the atmosphere to keep them from wilting. Keep the temperature a little higher after the cuttings have callused.

ARDISIA. The Red-berried Ardisia, *A. crenulata*, continues to be one of the most attractive Christmas plants. It can be recommended as a first-class window subject, owing to its apparent indifference to a little cold or occasional neglect in the way of watering.

Culture. It prefers a cool greenhouse in Winter and the pots should be plunged in a partially shaded place out of doors in Summer. A good soil consists of equal parts of loam, sand and peat. Well decomposed manure may be added when potting large plants. When the plants start to flower give plenty of air and keep near the glass. A small amount of soot added to the water benefits the coloring.

Propagation. Seeds may be sown during the latter part of January. Plants over one year old are never without a crop of seed at any season, if they are in good health; and frequently we see them



ARDISIA CRENULATA.—(See page 61)

with two crops at one time along with the flowers, which in a short period produce the third crop of berries. The old fruits have usually a grimy appearance from hanging so long on the bush. When there is any choice in the matter the oldest berries should be taken for sowing, as they will be the first to fall from the plant. Wash the pulp from around the seed and sow immediately, cover the seeds with a quarter of an inch of soil, firming well and giving the pots or boxes a position in a cool house. Keep the soil moderately damp, with abundance of air during mild weather. Conditions such as these will give the seed ample time to germinate and make plants in 4-inch pots by the following Fall. Cuttings root freely in sand, but do not make as symmetrical plants as seedlings. When the old plants get leggy the tops are easily rooted by making an incision in the stems and tying moss around them. These tops make very fine dwarf specimens.

ARTOCARPUS (The Bread Fruit). For large conservatories *A. incisa* is very effective, because of the large leaves having a fine decorative effect.

Propagation. When the plants get to be too tall the top may be rooted by mossing and afterward the stem may be cut up into lengths and placed in sphagnum moss. Many of the buds make small growths which can be removed with a firm heel when a few inches long and rooted in sand.

ASPARAGUS (Asparagus Fern. Smilax). As pot plants there are three species of value; these are *A. plumosus nanus*, *A. plumosus tenuissimus* and *A. Sprengeri*.

A. plumosus is a very distinct plant from *A. plumosus nanus* and probably is a distinct species. (See Vines). *A. plumosus nanus* makes a profusion of short growths from the base, and may be kept in this condition by pot culture and pinching shoots that show a tendency to run up; for it will grow 30 feet high under proper conditions. *A. plumosus* is used in large quantities for cutting and when so desired must be given the proper culture. *A. plumosus tenuissimus* is a wiry-stemmed variety with less dense fronds than *nanus*.

A. Sprengeri differs considerably from *A. plumosus*, the cladodes being longer, wider and flat and less numerous. It makes a very ornamental pot plant when covered with its bright red berries. It is grown very much for cutting.

A. asparagoides (Smilax) is a climber with cladodes about 1 inch long and quite wide. It is widely grown by florists for use in decorations.

Culture. *A. plumosus* is planted in beds when sprays and strings are desired. If grown for trails they must be trained on strings. Their general culture is easy. *A. Sprengeri* does best where its branches are allowed to hang down instead of being planted in a bed like the better known *A. plumosus nanus*. The ideal method is to have the plants in large wire baskets suspended from the roof of a house; and where the plants underneath don't suffer from drip or shade this system will work all right. Where a large supply of this green is wanted the north wall of a house may be used economically by erecting trough-like receptacles running the entire length of the house. The top one may be as near the glass as possible, the next in front 6 or 8 inches lower down, and so on, giving enough room to prevent crowding of the branches.

A. asparagoides is grown in beds and trained on silkline for long strings.

Propagation. Dividing starved plants is the readiest method of increasing *A. plumosus nanus*. Wash out the roots and place the divisions in moderately wet sand, to make a few roots before potting. Seed of *A. plumosus nanus*, or that which is offered under the name of *A. p. nanus*, is not always to be depended upon, unless the seed is procured from a reliable source or home grown, and known to be true to name. The reason for this is that *A. plumosus* is the kind which fruits most freely, and some not knowing the difference between the two sorts and others knowing, but also appreciating the fact that *A. p. nanus* is the better of the two, and that seed going under the name of the latter is sure to command the best prices. Germination is very irregular with seed sown in some soils. The best medium is rough grained sand that does not pack. Cover to the depth of half an inch.

A. plumosus tenuissimus is of a lighter green than *A. plumosus* and *A. p. nanus*. If cuttings of the ripe branches are put in bottom heat they will root freely. In small pots the plants are very ornamental and useful for associating with ferns and other plants in filling pans. This Asparagus used to be trained on strings, but has been superseded for this purpose by *A. p. nanus*.

In increasing *A. Sprengeri*, old plants may be divided for planting out, and for small specimens in pots, which are useful in associating with Ferns. Seedlings are easily raised. The plants ripen seed in mid-Winter. If cleaned and sown as soon as ripe the seeds germinate quickly.

A. asparagoides is raised from seed sown in February. They are potted in 2-inch pots when 2 or 3 inches high, and in May the plants are shifted to 3-inch pots.

ASPIDISTRA. The Aspidistra will stand more neglect than any other house plant and always lives in hot and draughty hotels and public buildings. *A. lurida* and *A. lurida variegata* are the ones most commonly grown. It is said that *A. lurida* is hardy as far north as Philadelphia.

Culture. Because the plants will stand almost any sort of conditions their culture is very simple. If the foliage is wanted for cutting, they may be planted under the benches in waste spaces. A poor soil is needed for the variegated variety or the variegation will disappear.

Propagation. The usual way to increase the stock of these very valuable decorative plants is to divide up large specimens into small pieces, potting and keeping close until they make fresh roots. A method requiring a little more work, certainly, but giving salable plants in a shorter period, and more of them, as every small piece will grow, is to shake the old plants out, disentangle the rhizomes as carefully as possible, and wash clean, saving every little piece that is likely to grow. Cut the rhizomes into small pieces, with roots attached, and put in the sand bed to make fresh roots; subsequently put in small pots and keep close for a few days.

ASTILBE, Forcing, or Florists' Spiræa. Although the florist grows principally the forms of *Astilbe japonica*, the white, and *A. Davidii*, the pink, there are a great number of Spiræas which are very beautiful, namely: *A. Lemoinei*, which has white petals and pink stamens; *A. Thunbergii*, the flowers of which are white but change to pink and are borne on red stems; *A. japonica Gladstone*, the common white flowering sort; *A. rosea* var. Queen Alexandra, a superb deep pink variety, excellent for Spring forcing, but seldom early enough for Easter; and *A. rosea* var. Peach Blossom, bearing lighter pink flowers than Queen Alexandra. The Astilbes furnish an excellent large plant for small money and are usually sold as pot plants, but the sprays may also be cut. Astilbes are hardy and are useful as border plants, but in order to be grown successfully they must have an abundance of water.

Culture. Stock is usually received in Midwinter and may be left in the case for a week out of doors in order to be sure it has frozen. Before potting soak the clumps in a tub of water in order



CYPRIPEDIUM ACAULE

This is one of the daintiest light pink hardy Lady Slipper Orchids.—See page 108.

to get them thoroughly moistened. Pot in 6-inch pots, if possible, for the roots are large. If huge specimens are preferred, three clumps should be placed in 8- or 10-inch pots. Place them deep in the pot. Set the pots in the Violet house, or in some cool place where they may root thoroughly. The cooler they can be forced the better spikes of bloom are produced. It takes ten to fifteen weeks to get the plants into bloom. The pink sorts, like *Queen Alexandra*, are the slower ones. In February, when growth starts, the plants are placed in a house in which a temperature of about 55 degrees is maintained; those for Easter can be placed in a warmer house, while those for later Spring flowering may be left in the cool house. Because of the great mass of roots which must be crammed into the pots, little space is left for soil and consequently the plants will dry out rapidly. They may require watering twice a day. When only a few are grown saucers filled with water may be used beneath the pots. The plants are susceptible to fumigation which causes the tip of the leaves to turn brown if they are not thoroughly matured.

Propagation. Astilbes may be propagated by seeds or division. The seeds are sown in the Spring, using flats in the greenhouse. They may be planted in the open ground when large enough and will bloom the second year. By division the plants are readily multiplied. Forced plants may be divided and set in the open ground. The florist prefers to import his stock rather than propagate it.

ATTALEA. The Attaleas, especially *A. Cohune* and *A. excelsa*, are noble cut-leaved Palms. They are very attractive even in the comparatively small stage, and for large, roomy structures they are very graceful. They should not be used for house decoration, as they are rather costly and in a young state make slow growth. When they are 20 or 30 years old, however, they are very ornamental subjects for tall structures. The seeds are about 2 inches in length and are now being put on the market as bowls for tobacco pipes, a purpose for which they are splendidly adapted. An acquaintance has been using one of these bowls for about 15 years and the finest meerscham cannot begin to compare with it. (See also Palms.)

AUCUBA (Gold Dust Tree). The many beautiful forms of *Aucuba japonica* thrive splendidly out of doors in Washington, with little or no attention beyond a layer of dead leaves on the surface of the soil occasionally. This mulch may be continued with advantage even during the Summer months. Some of the larger leaved varieties are beautifully variegated. The sexes are on separate

plants and flower profusely. When there is a plentiful supply of their gorgeously colored fruit the plants present a splendid appearance. If we would have the maximum number of berries it is the usual practice to hand pollinate the seed bearing flowers.

Culture. They grow in cool houses, under conditions suitable for Azaleas. They must be hand fertilized in order to fruit. Pot in a sandy loam with good drainage and give plenty of water during growing period.

Propagation. The Aucuba and its varieties are among the easiest things to propagate from cuttings; goodly-sized pieces even 6 inches in length may be rooted in Autumn in a cool propagating house; the new roots are very large, therefore they should be put in at least 4-inch pots before they get too lengthy.

AZALEA, Forcing. *Azalea indica* is a native of parts of China, and is the most commonly used by the retail florists and for greenhouse decoration. Thousands of plants were imported from Belgium and Holland annually before the Federal quarantine, coming to this country well packed in crates in the Fall of the year. The varieties noted for their earliness, among which are Vervæneana, Simon Mardner, Madame Petrick, Marie Antoinette and Deutsche Perle, can be brought into flower for Christmas.

Culture. After they are unpacked from the cases in which they were shipped they may be potted up at once and be placed in a frame or greenhouse in a temperature of 50 degrees, and syringed with cool water once or twice a day according to the weather. If the weather is clear and sunny, and not cold, several times each day will not hurt them, but if, on the other hand, it is dull and moist, once or twice a day would be quite sufficient. To hasten their development a warm temperature can afterward be given. It takes from six to eight weeks as a rule, at a temperature of 60 degrees, to bring Azaleas into flower. *Azalea indica* is obtainable as a decorative plant from Christmas until after Easter, a period of from 14 to 16 weeks, and those plants not required for Christmas or New Year can be grown on under cool treatment (50 degrees) and be allowed to flower naturally.

Speeding up Temperature. Of course, if at any time growth has to be hastened, the plants can be transferred to a warm house; they will bear quite a warm temperature. If forcing must be resorted to, it should be remembered that such plants do not make the best subjects for dwelling rooms, as they are less resistive of the conditions there.

Removing Buds. Plants so grown will generally start growth buds from the base of the flower bud, or by the side of it, and as this might result in the pushing off or dropping of the flower, these growth buds should be removed. Where this is done, however, there can be no growth in that direction the same year.

Watering. The plants require to be well watered and kept free of insect pests, which is a simple enough matter. The rule in watering should be to keep the soil just moist, without being wet. The weight of the pot will tell an experienced grower whether the plant requires watering, or if he is undecided, a sharp tap with a stick or with the knuckles will satisfy him. A dry ball causes the pot to ring clear, while a plant not in need of water will give a dull sound.

After Flowering, or on removal from the dwelling house, pick off all the flower buds and seed pods, if such are forming, and as plants from imported stock will not require to be repotted at once, they can be taken out of doors, provided they have been hardened off, and arranged alongside a wall or hedge in a moderately sheltered, shaded position. Some growers plunge the pots to their rims in the soil, or in sifted ashes throughout the Summer. The plants must be kept well supplied with water and sprayed or syringed as frequently as possible, as otherwise they are apt to become subject to thrips and other insect pests. Growth will continue, and the new flower buds will develop; consequently at this period watering with liquid manure may be required. In the Autumn, after the growth has finished and has ripened, lift the plants from their Summer quarters and transfer them to the protection of a greenhouse, or smaller structure, where frost can be kept out.

The Winter and Spring treatment would be as already described, only that this time regular feeding with liquid manure would have to be given, and in the Spring, after flowering, the plants would have to be repotted, not necessarily in larger pots, but in pots at least the same size, the old soil being shaken out, and some of the roots trimmed off, so that new compost could be employed. This should consist of leafmold and fibrous peat in equal parts, to one part of good turfy loam. Perfect drainage must be accorded.

The same procedure applies to the Ghent Azaleas—*A. mollis* and *A. sinensis*, which are hybrids between some of our American Azaleas and the Caucasian yellow-flowered *A. flavum*. A few of them are quite hardy, but most of the large flowered varieties are not.

As plants for dwelling rooms the Azaleas last well and are highly decorative and desirable. Give them sufficient water, keep them well into the daylight by having them near the window, and if possible the atmosphere should not be warm and dry. It is the hot and dry condition of dwelling rooms that causes the flowers to fade quickly.

Propagation. Most of the Azalea stock previous to quarantine 37 was imported, but of late years some progress has been made in this country in propagating on a commercial scale. It is propagated by grafting, layers and cuttings.

BEGONIA. This genus is a deservedly popular one, as it possesses numerous species and varieties, useful either as greenhouse, window or bedding plants. (For sorts used as bedding plants, see pp. 177 and 282). Nearly all of them will grow in a wide range of soils. Two parts loam and a third of equal parts decayed cow manure and sand will be found to answer the requirements of most of them.

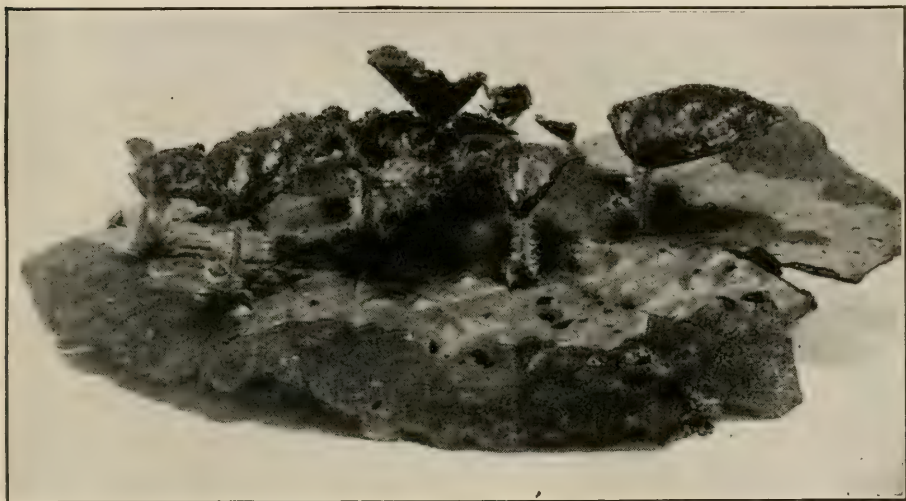
The Tuberous-Rooted Section behave grandly in some parts of the country when planted out. They should be planted in the shade and given a soil rich in leafmold. In the warmer localities they do not thrive. The tubers are wintered much in the same way as those of Caladiums or Gloxinias. Young plants are raised from seed in Spring, but they bloom late. They are also excellent for Summer decoration of the conservatory.

Fibrous-rooted Sorts. The fibrous-rooted sorts require plenty of light, fresh air and good soil consisting of three parts of loam, one part well-decayed manure and one part sand. Examples of fibrous-rooted Begonias are *B. semperflorens*, *B. fuchsioides*, *B. incarnata*, *B. foliosa*, *B. albo-picta*, *B. peltata*, *B. Scharffiana*, *B. Duchartrei*, *B. Haageana*, *B. metallica*, *B. sanguinea*, *B. nitida*, *B. coccinea*, *B. argenteo-guttata*, *B. maculata*, *B. Thurstonii*, *B. phyllomaniaca* and *B. President Carnot*. Cuttings are taken of these sorts in the Spring for obtaining good plants for Winter bloom.

Rhizomatous Sorts, Includes Rex. Most of the rhizomatous sorts are grown for their exquisite foliage. Their requirements are much the same as for the fibrous-rooted kinds. The following species are commonly seen: *B. Rex*, *B. speculata*, *B. goegoensis*, *B. ricinifolia*, *B. heracleifolia*, *B. Feastii*, *B. manicata*.

Rex Begonias, Leaf Cuttings of. After the rush of propagating the soft-wooded plants in the Fall, the cuttings of the Rex

Begonias may be put in the sand bed. Select the mature leaves of those plants which are growing in a rather cool house. The pieces for cuttings will give good results if they be cut in a triangular shape, 3 inches each way. The part to be inserted in the sand should end with one of the thick ribs or veins which are prominent on the undersides of the leaves. From a medium-sized leaf eight



ROOTED CUTTING OF REX BEGONIA

or ten cuttings can be got. Put them in the sand to the depth of about an inch and maintain a moderately humid atmosphere to prevent wilting. Place in thumb pots as soon as the leaves show above the sand. The old leaves are sometimes used entire, first by giving a few cuts across the principal ribs, then placing them flat on damp sand or moss. The other method is to be preferred, because more plants can be got from one leaf. It is equally as quick and takes up much less room on the propagating bench.

Gloire de Lorraine Group. Begonia Gloire de Lorraine is a hybrid variety resulting from a cross between *B. socotrana* and *B. Dregei*. *B. socotrana* is an annual species, Winter flowering and characterized by the production of small tubers. *B. Dregei* is a small-leaved, semi-tuberous sort. Gloire de Lorraine is one of the finest light pink Begonias on the market. From it has been developed several other varieties of note, namely: Glory of Cincinnati, a form with larger flowers but of the same light pink; Turn-



BEGONIA GLOIRE DE LORRAINE

ford Hall, a white flowering sort; Melior, large, delicate rose; Mrs. J. A. Peterson, a superb deep pink sort with bronze foliage. *B. socotrana* is a native of the hot, sandy island of Socotra and seems to transmit to the hybrids the preference for a light soil and a high temperature.

Propagation. The varieties of this group may be propagated by leaf cuttings or division. Soon after January first the mature leaves are cut from the plants. The stems of the leaves are shortened a little and placed in the propagating bench. The leaf should not lie flat on the sand, otherwise the damping-off fungus will

be in evidence. A bottom heat of 70 degrees is advised, and a relatively high humidity. It usually takes about a month for the cuttings to root. They should not be potted until the little plants start from the callus. Propagated by division the plants are usually less bushy, but because many shoots are sent up from the roots the stock plants can be divided after the leaf cuttings are taken. The soil should consist of leafmold and fibrous loam in equal parts and some charcoal should be added to keep the soil sweet. Continue to use a loose soil during their growth. Two-inch pots will be large enough at first, but the plants must not be pot-bound until flowering time when the plants should be in 10- to 12-inch Azalea pots. They will enjoy a partial shading and a temperature of 60 degrees until they flower; then they should be kept cool, about 45 degrees to 50 degrees. Pinch the plants to make them bushy and stake them when they need it. Care should be exercised in watering so that the foliage is not wetted, else the leaves will drop. When coming into bud, watering with liquid manure will be of value.

Winter Flowering Begonias. The Winter flowering Begonias have resulted from a cross between *B. socotrana* x the tuberous-rooted sorts. They are strong growers and more robust than the Lorraine group; they have large flowers and are of easy culture.

Culture. The proper soil is one composed of half loam and half leafmold and a sprinkling of sand. When potting the bulbs just cover them with soil, but do not press the soil over them firmly. Give them a temperature of 60 degrees to start and keep them shaded. At the flowering time the temperature may run to 65 degrees; this will be any time during September to January. After flowering, reduce the temperature again and gradually withhold water, remembering to continue to give enough water so that they retain their foliage. The plants will naturally have a bad appearance from March to May. They must not be perfectly dry as is proper for the tuberous sorts.

Propagation. As the flowers are sterile, they will produce no seeds. Cuttings are taken in April and rooted in pots, placing three or four in each pot. When rooted, pot them singly. Both the cuttings and the newly rooted plants should be placed in a frame of the propagating house.

BOUGAINVILLEA (See page 365).

BOUVARDIA. A much grown Winter flowering plant some years ago which is again coming into popularity. Pink, white and red are the prevailing colors; single and double varieties are cata-



BEGONIA MRS. J. A. PETERSON

This Begonia is of the Lorraine type but has glossy bronze leaves.—See page 72.

logued; among the latter there are Hogarth, a red; *Humboldtii*, a white; Pres. Garfield, a pink.

Culture. To make bushy plants the leading shoots should be pinched repeatedly. The time of flowering can be regulated by the time of pinching back. About the middle of September, or earlier, according to location, the plants are lifted with balls of earth attached, and either planted on benches or put in pots. Keep the atmosphere moist and close for the first few days, and the plants shaded from the sun. A minimum temperature of 55 degrees is necessary for perfect development.

Propagation. Young plants are raised early in Spring, from small pieces of the roots, placed in flats of sand and kept in a warm house. For the first week or two cover the surface of the sand with damp sphagnum moss; this will encourage the formation of buds on the roots. When the growths are of sufficient size, put in 2-inch pots, shifting into 3-inch pots, and plant outside during the latter part of May.

BROWALLIA. A blue-flowered annual which is very useful for pot culture in the greenhouse as well as for blooming in the border. The commonest species are *B. speciosa*, a large flowering sort; *B. demissa* (*B. elata*), which is usually smaller flowering. Blue and white may be obtained.

Culture. Place near glass and pinch back the plants frequently to produce an abundance of bloom.

Propagation. For indoor culture, seeds should be sown the latter part of August; a few in a 4-inch pot. Discard the weakest seedlings, leaving three or four in a pot, and shift into 6-inch pots to bloom. In the garden the seeds are sown thinly in the Spring when danger of frost is passed.

BRUNFELSIA. About half a dozen species are common in cultivation. Out of this number there are at least two well worthy of attention as pot plants—*B. (Francisceae) latifolia* and *B. eximia*. The former is very free in producing flowers, and is one of the best plants to put out in the permanent bed of a warm conservatory. The plant flowers during the late Winter months from the wood made the previous Summer. On first expanding, the flowers are light purple, changing as they grow older to pure white.

Culture. These plants should be grown indoors all the year round. Winter is their resting period, and during that time they should be watered but sparingly. The soil should be of fibry loam,

sand and lime rubble; a small quantity of leafmold may be added. Night temperature, 50 degrees.

Propagation. Old plants sucker freely, and if severed an inch or so beneath the surface of the ground and put in the propagating bed, they will quickly form new roots and develop into specimens large enough for 5-inch pots within a year. In rooting any of the kinds, take very large pieces; dust the cut part with powdered charcoal; allow it to dry, then put in a pot of dry sand and keep dry till rooted.

BRYOPHYLLUM. A quite attractive plant when in flower. It is commonly known as the Chinese Lantern Plant. *B. pinnatum* and *B. crenata* are the species commonly grown but are not of sufficient ornamental value to be grown in quantity.

Culture. They are quite easy of culture. Give plenty of light, heat and moisture. Use a loose, rich soil with plenty of drainage.

Propagation. Plants may be grown from seed or cuttings, but the simplest method is to place a full grown leaf on moist sand. In a short time small plants will grow from the notches of the leaves.

CACTUS. This name is applied to all the members of the family. Formerly it was the adopted generic name of a large number of plants which are now divided into several genera. Quite a number are hardy in the Middle Atlantic States; among these are *Opuntia arborescens*, *O. Rafinesquii*, *O. vulgaris*, *O. missouriensis*, and one named *O. phæacantha*. Some of the gaudy-flowered greenhouse kinds, such as *Cereus flageliformis*, *C. speciosissimus*, and the much admired night bloomers *Selenicereus* (*C.*) *grandiflorus* and *S. (C.) Macdonaldiæ*, when in good condition, so far as the drainage and soil in the pot are concerned, may be plunged in a sunny spot out of doors, where they will make growth much superior to that attained in the greenhouse. If the plants are in good health wet seasons will do them no harm.

Culture. Cacti prefer a cool soil and the air overhead warm; they thrive best when planted in the open ground of the greenhouse. Never place on benches over heating pipes where the soil dries out. Supply sufficient water to keep the soil moist. Give good drainage, and a small amount of lime should be added to keep the soil from souring. An open, porous, sandy soil is required.

Propagation. Two of the methods of increasing the stock are by seeds and grafting. In the former method use a soil of equal

parts of well-decayed sod and pure sand; it should not be rich in humus. Enlarge the hole in the bottom of a 4-inch pot which has been well sterilized and fill the pot one-fourth full of finely broken pots. Sow the seeds on the lightly pressed soil and cover with a very thin layer of soil with a thin layer of gravel on top. The gravel keeps the soil from washing and helps to prevent it from drying out. The temperature should be about 70 degrees. When several spines have formed, transplant into flats of the same soil.

In order to cause earlier flowering or to increase the decorative appearance of the trailing sorts, grafting is resorted to. The Epiphyllum or Christmas Cactus is usually grafted upon the upright growing *Pereskia* and *Cereus*. Cleft, saddle and splice grafts are used. The clefts in the stock are cut V-shaped, rather than split, and the cions should be trimmed wedge-shaped to fit the cleft. A spine from an *Opuntia* or a *Pereskia* is frequently used to prevent the cion from slipping on account of the sap given off by the Cactus. For *Mamillaria*, the *Echinocactus*, the *Echinocereus* and other globose or thick sorts, the stock selected should be about the same diameter as the cion. Cut the surface of stock and cion perfectly level and fit and tie together with a cloth or soft cord.

CALADIUM. (See Bulbous Plants).

CALANTHE. This is not an epiphyte, but a terrestrial Orchid growing in soil. It responds very readily to good treatment. As the demand for Orchid flowers is on the increase this must eventually become a popular genus. *C. Veitchii* is the best species; it is a Winter bloomer and has rose-colored flowers.

Culture. Loam, peat, sphagnum and well-decayed cow manure with a little sand added, will form a good mixture. Good drainage is necessary, as the plants, while growing, need heavy waterings. During the growing season a high temperature is necessary, lowering it and curtailing the supply of water when growth is completed. When done blooming either shake the plants from the soil and stand them in empty pots, or withhold water from the roots. They should be started in March. Careful watering is necessary at first.

Propagation. They are increased by separation of the bulbs at the time of repotting. This is one of the few species which allow being propagated freely.

CALATHEA. Closely resembling and often known as *Maranta*. They are grown solely for their ornamental foliage, nearly all of the species having beautiful markings. It is doubtful if any other



CALATHEA ZEBRINA (MARANTA ZEBRINA)

genus shows greater variation in this respect. Some of the best known stove kinds are as follows: *C. Baraquini*, *C. bella*, *C. fascinator*, *C. Lindeniana*, *C. Makoyana*, *C. vittata* var. *albo-lineata* *C. roseo-picta*, *C. zebrina*, and *C. Veitchiana*. Those which may be grown cooler are: *C. Pavonii* (*tubispatha*), a species which loses its leaves and goes to rest for the Winter; *C. illustris*, *C. Lietzei* and *C. pulchella*. The latter resembles *C. zebrina* in the upper portions of the leaves, but the inferior margins are almost green.

Culture. Most of the kinds are stove plants, growing in shade all the year round, with a minimum temperature of 60 degrees. They need an abundance of water at all times. In Winter, when the benches are apt to get dry quickly, the pots should stand on a layer of sphagnum moss. Some of the species will succeed in a temperate house, and a few of the stove kinds may be subjected to a lower temperature, without injury, after they have made their growth. None of the species should be allowed to flower, as this only weakens the plants and seed is not necessary, as they all divide very freely. During the growing season, if drained thoroughly, they can hardly be overwatered.

Propagation. Calatheas, which are freshly divided, should not be potted in fresh soil until new roots have been formed. This condition may be brought in the following manner: Knock the plants out of the pots before growth commences; wash the soil from among the roots; prune out those not wanted, and divide into clumps, not too small, about large enough to go into a 5-inch pot, and put in the propagating bed. Let the air be close and moist, and the glass shaded. When a few fresh roots have been formed they take very quickly with the soil after potting.

CALCEOLARIA (Knitting Bag Plant). The Calceolaria, both shrubby and herbaceous, is as well-known in western Europe as the Zonal Pelargonium in America. The shrubby kinds are there much used in bedding, producing very gaudy effects. They delight in a cool, moist atmosphere, and our hot Summers make short work of them. The herbaceous hybrids derived mainly from *C. crenatiflora* and *C. arachnoidea*, are raised from seeds sown about the month of August. The seeds are very small and should be sown on the surface of the soil and pressed down, covering with glass until the seed leaves can be seen. At all times the plants require a cool, airy spot when in the greenhouse. From the seedling stage until the plants are likely to get hurt by frost they should be kept in a frame. Green-fly is their greatest insect enemy, and must be prevented from gain-

ing a foothold on them by fumigation. Several of the species of *Calceolaria* are much easier to grow than the hybrids, and some of them are very ornamental. *C. scabiosæfolia*, a sort with compound leaves, may be flowered a few weeks from the seedling stage by keeping the plants in small pots. It may, however, be grown 3 feet high by shifting when necessary. Seeds may be sown from August to January. The soil should be of an open nature; cow manure and leafmold should form one-fourth of the mixture.

CALLISTEMON (Bottle Brush). The Callistemons, especially *C. lanceolatus*, *C. rigidus*, *C. speciosus*, make interesting flowering plants in early Spring for a cool conservatory.

Culture. They may be treated much in the same way as Acacias.

Propagation. Young plants are gotten up from seed, but they take a longer time to flower than when raised from cuttings: neither are they so free blooming.

CAMELLIA. Two species, *C. japonica* and *C. Sasanqua*, are grown and some old plants of these relics of the past will occasionally be found in old-established greenhouses. They are kept, especially the white varieties, solely for the flowers, which are used in making up designs. In private and public gardens we see them oftener, and in such places they should be more grown, as they are capable of making exceedingly attractive displays during the Winter months.

Culture. Potting is best done after the flowers fall. Loam two parts, peat or leafmold one part, and about one-sixth of the whole, sand, will make a good potting compost. They thrive best with limited root room.

Propagation. The varieties are perpetuated by cuttings of the ripe growths in late Summer, or by grafting before the growth starts, using stocks of strong-growing kinds, raised from cuttings.

CANNAS FOR WINTER BLOOMING. During Winter these plants respond very readily when anything like fair treatment is given, in the production of large heads of bloom. In fact, in a warm, sunny house, many of the kinds are equally as fine as they are in Summer, and some of them last longer in bloom, owing to the conditions for the production of good flowers being more under control. The orchid-flowered Cannas, that is, those having *C. flaccida* blood in them, are not well suited for outdoor work, as their flowers are too soft to withstand the glare of the hot sun; but for pot plants in Winter they are useful.

Culture. The plants may be started in small pots, giving larger ones as growth is made. They are gross feeders, and will take rich soil supplemented by occasional waterings with liquid manure. Pick the flowers as soon as they wilt to prevent the forming of seeds.

Propagation. Because of the hardness of the seed, special precautions must be taken or they will germinate slowly or not at all. Nick or cut the seeds and soak in warm water for one or two days. Plant in sand to the depth of about one inch and give plenty of bottom heat. This method is used in raising new varieties. A more common method is to divide the rhizomes. Every bud will make a plant, but larger ones may be obtained by leaving several buds together.

CARICA (Papaya). Small trees for pot culture, unbranched. The commonest species, *Carica papaya*, has leaves resembling those of the edible Fig. They usually produce fruit nicely indoors, and if one can become fond of their peculiar flavor, they are very good as an aid to digestion, because they contain papain.

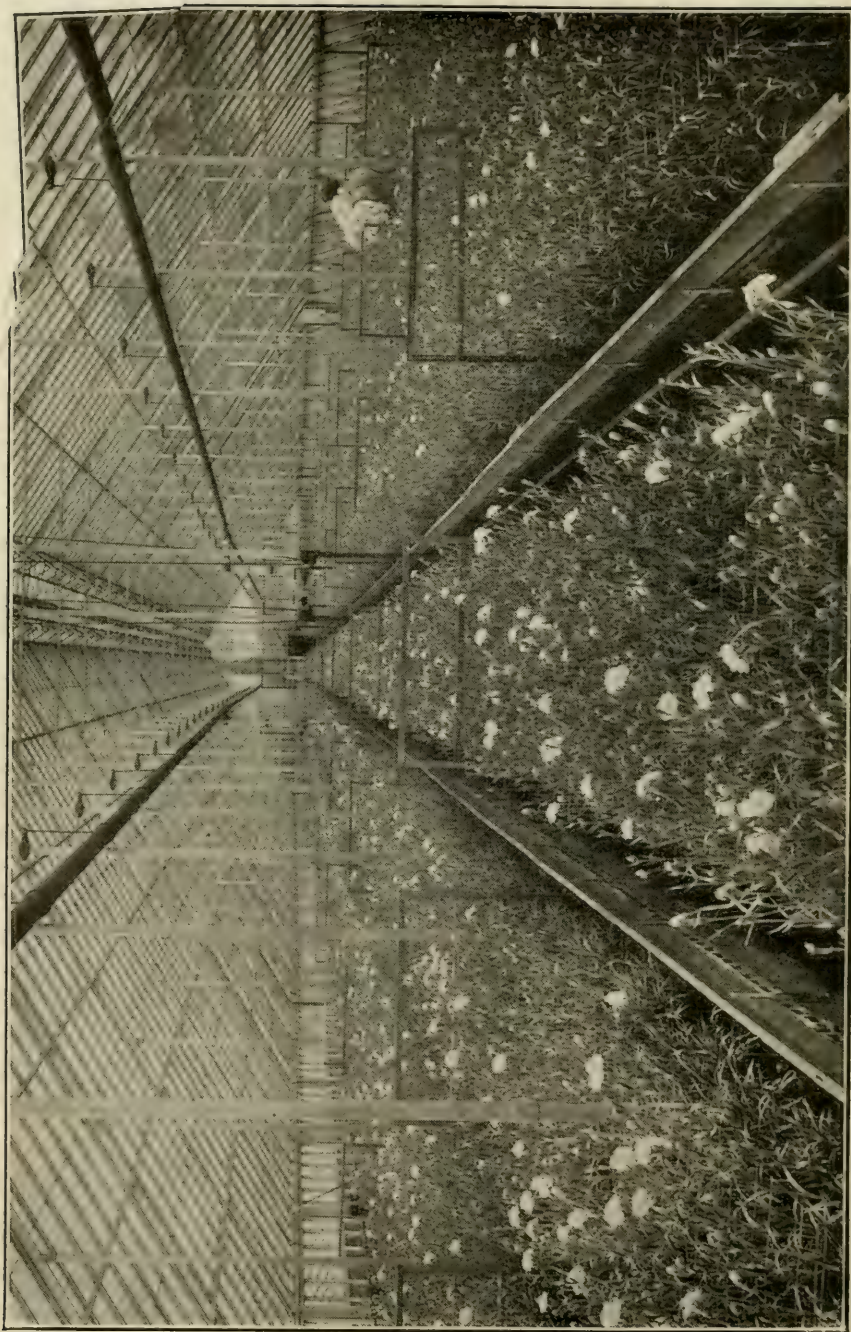
Culture. A well-drained, rich loam should be used for potting; give good drainage.

Propagation. Because cuttings are difficult to obtain the plants are grown from seed, sown in small pots placed in the shade until the seedlings have started. When the third leaf appears the plants should be repotted. Good, edible varieties are often grafted upon seedlings.

CARLUDOVICA. About six species are in common cultivation. They are usually taken for Palms, so closely do they resemble some kinds in the foliage; but they are not even related. The one most commonly grown, and perhaps the most useful for the florist, is named *C. palmata*; in leaf somewhat resembling a *Livistona*. The plants are useful for planting outside in shaded places in Summer, and if slightly hardened off they may be used in decorating. All the kinds are stove plants. The leaves of this plant are often used in making Panama hats.

Culture. Same as for Palms.

Propagation. From the seedling stage they develop rapidly into specimen plants. Old plants flower freely. The seeds are small and thin, about the size of those of *Mignonette*. Wash carefully from the surrounding pulp and sow in a box of finely chopped sphagnum. They germinate in three weeks. Let them grow in



HOUSE OF CARNATIONS

this until large enough to put three around the edge of a 3-inch pot; from these shift into 5-inch pots.

CARNATION. *Dianthus Caryophyllus* is the species from which the Carnation of today has sprung. Variation in the flowers, the result of continuous cultivation under artificial and highly favorable circumstances, produced, in the first place, well marked varieties; these variations were perpetuated by cuttings, and from them by means of cross-breeding and from sports distinct races have been evolved, gradually showing a wider range of color and habit. In America the climatic conditions are peculiarly favorable for the development of the flower under glass, and little by little a race has been obtained perfectly adapted to Winter production of bloom. Not many years have elapsed since the best cultivators of plants would have predicted a short life for the Carnation raised under glass, and this would probably be the case were its entire life, or rather the lives of several generations, spent in this way. But the utmost vigor is imparted to the plants shortly after the cutting stage is passed by their cultivation out of doors for the best part of the Summer. Another very favorable means, which is without doubt highly instrumental in maintaining and strengthening the vigor of the race, is the raising of new varieties from seed. The development of the wonderful blooms of today, represented in such varieties as Winsor, Beacon, White Perfection, the forms of Enchantress and others too numerous to mention, dates back only a very few years when the blooms were of very ordinary dimensions, stems weak and calyx often imperfect. Nearly every grower has been more or less engaged in raising new forms by crossing varieties. The work along this line presents no serious difficulties and while hundreds of thousands of seedlings have been rejected, numerous meritorious new ones come into prominence.

Varieties. The best varieties to grow in any one place cannot be pointed out except by experiment, as there is no variety which does equally well in all soils. When once the best sorts for any particular soil are selected they should not be discarded until new and improved or other kinds have been tested for at least a season.

CULTURE

Planting in the Field. In the locality of Washington the plants are safe out in the field by the end of March, but climatic conditions are the only safe guide for different localities. The ground is previously prepared by manuring, plowing and harrowing, and the plants set

out 15 inches apart each way, or 15 inches apart and 3 feet between the rows, according to the method of cultivating. Let the plants be in the ground some time before getting their first pinching. Cultivating must be assiduously practiced during their stay in the field. It serves three purposes: Keeps the roots cool, prevents loss of water by evaporation, and discourages the growth of weeds. Flower shoots are nipped out as soon as they appear until the plants have made sufficient growth, or a short time before they are removed to their flowering quarters.

Lifting and Planting. This is done at different seasons, sometimes early, but usually in September. In some soils it is difficult to lift with a ball; in others, easy. Some growers shake the soil from the roots, no matter in what soil plants have been grown. As the Carnation is rapid in forming feeding roots it is easy to understand why it is desirable to have the roots entirely in the most favorable soil, such as that with which the benches should be filled; but the safer and more logical method is to have a moderate amount of soil accompanying the roots from the field to the bench. When the plants are lifted without soil clinging to the roots they should be protected from the drying influence of the atmosphere as much as possible. As soon as lifted place them in a receptacle, from which they do not have to be removed until they are planted in the bench soil. Put the roots about the same depth in the bench as they were in the soil from which they were taken; make moderately firm; water well and shade for the first few days. Use a shade which is easily removed. A mixture of clay and water may be applied with a garden syringe; test it before applying to ascertain if it comes off easily, as it sometimes sticks on longer than wanted.

Planting in the House. This is a practice which has become common during the last few years, that is, putting the plants into the greenhouse beds instead of planting out of doors. It has its advantages and disadvantages. In the Winter months the cut is much larger than that from field-grown plants housed late in the season, but this advantage is to a certain extent offset by having to discard the old plants in May or earlier to make room for the new ones and were all the Carnations planted after this method there would be no flowers during the Summer months; therefore, both methods will continue to have their advocates.

Soil. This should be of a friable loam, mixed thoroughly some time in advance of using with one-fifth of its bulk of rotted stable manure. The depth of soil may be from 4 to 5 inches. The plants



CARNATION MRS. C. W. WARD
One of the best pink varieties ever introduced.

are given space according to the variety. In this connection it may be stated that a good place to look for the kind of flower common 25 years ago is on a bench, the soil of which is completely hidden by the plants. As much light as possible should be admitted to all parts of the plant, and it is as important that air should have free circulation among the plants.

Supports. The different methods are getting to be about as numerous as the varieties of Carnations. A good circular wire support should be easy to apply, easily removed and stored, give the minimum amount of shade to the plants and be moderate in cost. Several of the designs on the market are satisfactory in all of the above particulars, excepting the cost, which, while as low as one could expect, is the only hindrance to their use.

Temperature. A minimum temperature of 50 degrees, rising during the day to 65 degrees, will be found the proper range for the best results. The humidity of the atmosphere must be greatest immediately after the plants are benched to induce the formation of new feeding roots, gradually reducing it when the plants show signs of having become established.

Syringing. In dull weather there is usually enough moisture in the atmosphere for the needs of the plants, so far as atmospheric conditions are concerned. In bright, sunny weather, syringing should, of course, be more frequently practiced. No rules can be laid down for this, however, as much depends upon the nature of the floor of the house in the quantity of moisture it gives off, together with the condition of the bench soil. If the atmosphere be too dry, combined with dryness at the roots, the foliage suffers to a certain extent, producing conditions favorable for the attacks of red spider, aphides and fungoid diseases. To strike the happy medium good judgment as the result of close observation will be necessary.

Feeding. The plants by their behavior will suggest the necessity for this. When manure is given in the liquid state it should be weak and applied often, rather than in strong doses at long intervals. Top-dressing with manures and fertilizers should be made the subject of careful experiment. It is not safe to follow given rules, as what may suit some soils will not act the same way with others.

Disbudding. The lateral buds should be removed as soon as they are large enough to be handled. If allowed to develop, they are simply a drain on the resources of the terminal bud; and, although they look well with the flower, still large flowers without them bring higher prices.

Ventilation is of primary importance at all times. Close houses only when the outside temperature is too low to permit of airing.

Carnations to Follow Chrysanthemums. Where Chrysanthemums are grown in large numbers on benches it is sometimes difficult to decide what should occupy the space vacated by them. Carnations have been tried with successful results. Boxes with easily removed sides and ends are placed close together in the field, filled with suitable soil, and the plants, six or eight, according to the width of the bench, put out in each box. On the approach of unfavorable weather the plants are given the protection of a frame until the indoor space is ready for them. The bottoms of the boxes are of stout material, and when placed side by side on the framework of the bench they may either be laid on the old bench boards or take their place. Soil is added after they are in position, to make the surface level. If necessary, rested Roses may be substituted for Carnations.

PROPAGATION

Propagating House and Benches. The ideal propagating house is the north part of a span-roofed house, with a partition of boards, leaving a space of about $4\frac{1}{2}$ feet available for bench and passageway. The latter need only be wide enough for one to move about in comfortably. The floor should be made of concrete, so that it can be kept scrupulously clean at all times. The length of the house should, of course, vary with the needs of the establishment. The bench should run close up to the side of the house and the front part, or that nearest the passageway, nailed up with boards, with a swinging door on leather hinges every few feet to increase or diminish the temperature of the sand by allowing heat to escape. It is a good plan to have one of the ends hotter than the other, not necessarily for Carnations, but for cuttings of other plants. Valves should be so arranged in the heating pipes of this part of the establishment that the heat may be under perfect control to suit the various uses to which it may be put. When a specially constructed propagating house is not available, a part of an ordinary growing house, preferably the north side, should be selected for the purpose. The conditions favorable to the process of rooting are: Sufficient humidity to prevent the cuttings from wilting, and protection against the sun's rays, which cause an evaporation of moisture from the leaves of the cuttings greater than can be spared, owing to the inability of the cutting to replace the loss quickly from the moisture in the sand.

Sand. When there is a choice, a rather large-grained sand and one free from all impurities should be selected; from 3 to 4 inches deep will be sufficient.

Cuttings. These may be put in any time during the Winter months, but February is the safest time for the ordinary crop. Those rooted previous to that month are apt to put on a spindling growth. Restricted root room has a tendency to promote hardening of the stem and firmness in the foliage, and while the Carnation is in reality an evergreen shrub, it is a soft wooded one, and should be kept in a growing state from the cutting to the flowering plant. The cuttings are usually pulled from the plant; this is the worst possible method, because the exceedingly delicate vessels in the immediate neighborhood of the break are strained and displaced, according to the tension exerted in severing. They strike all right, evidently so, but they should be severed with a knife.

Material for Cuttings. In this as in other matters, judicious selection of the material to form future plants will go a long way in determining whether these plants will attain the maximum state in healthy vigor, combined with flower productiveness. It does not take a very experienced Carnationist to tell at a glance whether the growths are flabby, as a result of being forced in too high and humid an atmosphere, or crisp and stocky, owing to having been subjected to favorable conditions. Grassy growths at the base of the plant are avoided, as they show a tendency to perpetuate this condition to a degree unfavorable to floriferousness. As the extra floriferous nature of a single branch of a tree or shrub can be perpetuated by propagating from that branch, in like manner the best material for cuttings is formed on the flowering branches of the Carnation. They are found in the axils of the older leaves, and should be taken when they are from 2 to 3 inches long.

Treatment During Rooting. The leaves of the cuttings are sometimes shortened back at the tips, but this is immaterial, and the practice has arisen probably through a desire to have the batch look uniform in size and to economize space. Each cutting should be dibbled in by itself, to insure perfect rooting conditions; but by making a cut in the sand with a small, flat trowel, guided by a narrow strip of wood placed and held firmly against the last row of cuttings (this precaution will prevent the loosening of the sand next the cuttings by the action of the trowel), the operation is hastened. The temperature should be from 50 to 55 degrees at first, increasing to 60 degrees later on. After rooting has commenced examine the

cuttings so that potting or boxing may be completed before the roots get weak in the sand. It may safely be commenced, when the roots are three-quarters of an inch long, and finished before they are over $1\frac{1}{4}$ inches. After the cuttings are potted, or boxed, keep them shaded for a time, gradually giving them the benefit of full sunshine and an abundance of air. Before planting out time they should be removed to a cool frame. The soil may be made up of loam, leafmold and sand.

CATTLEYAS. These are the most popular Orchid flowers at present, owing to their large size and delicate colorings. The best Cattleyas for general culture are: *C. Trianae*, flowering January to March; *C. Schroederæ*, March and April; *C. Mossiæ*, April, May; *C. Mendelii*, April and May; *C. Warneri*, May and June; *C. gigas*, June and July; *C. aurea*, June and July; *C. Gaskelliana*, August and September; *C. labiata*, October and November; *C. Percivaliana*, December. (See page 90.)

Culture. The Cattleya is fresh-air-loving and the temperature during the Winter should be 50 to 55 degrees at night. The plants are never kept dry because they are continually growing, flowering, or recovering from flowering.

CENTRADENIA. Of this there are three species, combining handsome foliage and rather pretty flowers. *C. grandiflora* has the largest leaves, and is the most useful for decorative work. The other species are *C. floribunda* and *C. rosea*.

Culture. An intermediate house suits them; they require but little shade. Use a soil consisting of leafmold and sand.

Propagation. Cuttings will root at any time of the year. To get good growth on the plants during Summer they should be started from cuttings in March.

CENTROPOGON. *C. Lucyanum* is said to be a bi-generic hybrid. The parents are given as *Centropogon fastuosus* and *Siphocampylus betulafolius*. It is one of the very best stove or warm greenhouse herbaceous perennials. There is no great difficulty in its cultivation; but it is seldom seen in collections. The flowers are rosy carmine, produced in mid-Winter.

Culture. After the blooming season is over the old plants may be given a period of rest, and then repotted, using a light, rich material.

Propagation. After blooming numerous small shoots will usually appear along the branches; these taken off with a heel root



CATTLEYA LABIATA.—See page 89

with bottom heat. The young plants will thrive in heat and moisture during the first two or three months; they may afterward be grown in a frame.

CESTRUM. Some of the species, especially *C. corymbosum* and *C. Newelli*, may be used for flowering about Christmas.

Culture. Keep in a sunny house, or the plants are apt to make too much foliage.

Propagation. Young plants are started about the end of August, the wood to be taken from old specimens planted out. As soon as rooted put in 3-inch pots, afterward placing three together in a 6-inch pot to bloom.

CHAMÆROPS. Resembling the *Latantias*, *C. humilis*, is one of the commonest and most widely cultivated Palms. Being one of the hardiest of all Palms, it is well suited to a house with a varying temperature. (See also Palms.)

CHORIZEMA (Tango Plant). For several years an old conservatory plant has been in commercial prominence. It is *Chorizema cordatum* var. *splendens*. The graceful plants with Holly-like leaves and orange and red Pea-like flowers are most attractive. Other sorts are also found, namely, *C. ilicifolium* and *C. varium*.

Culture. The plants should be shifted gradually to 5- or 6-inch pots, using plenty of peat. They may be placed in frames when the weather permits and given a little shade. Pinched frequently, the stock becomes branchy. Syringe often. In order to avoid overwatering, the pots should be filled high with soil; this will necessitate watering oftener, but it seems safer. During August or September the plants will be covered with long branches and then they should be tied into their flowering shape. Use wires bent to a slightly gobular form and place in the pots. Tie the branches on the wire, spacing them nicely. In a short time buds will spring from the axils of the leaves. Staked plants are more sightly and take less bench room. During Autumn and early Winter the plants should be kept cool, 40 to 45 degrees at night. If they are a trifle slow they may be moved to a warmer house, but by keeping cool some may be so retarded that they will bloom until April. In order to give the plants air and space they may be set upon inverted pots in the bench. The plants are best kept from year to year by plunging in a bed of ashes during the Summer.

Propagation. *Chorizema* may be propagated by seed or cuttings. The cuttings root easily in the cutting bench with a tem-



CHORIZEMA CORDATA SPLENDENS

perature of 65 to 70 degrees. Some growers prefer to root them in pots in a mixture of sand and peat covering with a bell-jar or placing in a propagating case. They may be rooted in the Winter or early Spring. Rooted in sand they should be potted in 2-inch pots, using two parts of loam, two parts of peat and one of sand. Place plants in light house at temperature of 50 to 55 degrees.

CHRYSANTHEMUMS. For nearly ten months out of the twelve Chrysanthemums are so little seen that when the flowers are in season they are eagerly welcomed by the flower buying public as a change from the blossoms of Spring and Summer. There is a gradual change in interest from the stiff and artificial looking flower, which is grown on single stems, to the more natural looking spray with smaller and singler flowers. Within the last twenty-five years

the cultivation of this flower has made rapid strides. The size of the blooms is due to this improved cultivation quite as much as to an improvement in the varieties by selection of sports and cross-breeding during that time. Many good kinds have been raised, but these kinds, when grown according to old methods, do not show the wonderful improvement that is claimed for them. Indoor bench culture and growing one flower to a plant is the means by which the flowers are developed to their utmost size.

The list here given contains the names of the best varieties grown today and are grouped according to type and purpose.

The Best Early Varieties: Chrysolora, Smith's Advance, Golden Glow, Unaka, Pacific Supreme, Polly Rose, October Frost, Robert Halliday, Monrovia and Roserie.

The Best Midseason Varieties: Chas. Rager, Dr. Enguehard, Major Bonnaillon, Col. Appleton, Roman Gold, Ivory, Alice Byron, Mrs. H. Robinson, A. J. Balfour, Chrysolora and Pink Gem.

Best Late Varieties: W. H. Chadwick, Golden Chadwick, Chadwick Supreme, Jeanne Nonin, Major Bonnaillon, Helen Frick, December Gem, Golden Wedding, Timothy Eaton, Dr. Enguehard, Mrs. J. Jones, Maud Dean and Nagoya.

Best Varieties for Retail Growers: Major Bonnaillon, Chrysolora, Smith's Advance, W. H. Chadwick, Dr. Enguehard, Chas. Rager, Golden Chadwick, Golden Glow, Ivory.

Best Exhibition Varieties: Wm. Turner, Dr. Enguehard Wells' Late Pink, Lady Hopetoun, Maud Dean, Naomi, Pockett's Crimson.

Best Pompons: Baby, Diana, Elva, Frank Wilcox, Fairy Queen, Golden Climax, Golden Harvest, Golden West, Harvest Moon, Helen Newberry, Julia Lagravere, Lillian Doty, Queen of Whites, Quinola, Western Beauty and Zenobia.

Best Singles: Ceddie Iason, Dorothy Duggan, Dorothy Dann, Excelsior, Golden Mensa, Kitty Bourne, Mrs. E. D. Godfrey, Mary Richardson, Merstham Jewel, Mrs. Whitehorn, Margaret Walker and Mrs. Wm. Buckingham.

CULTURE

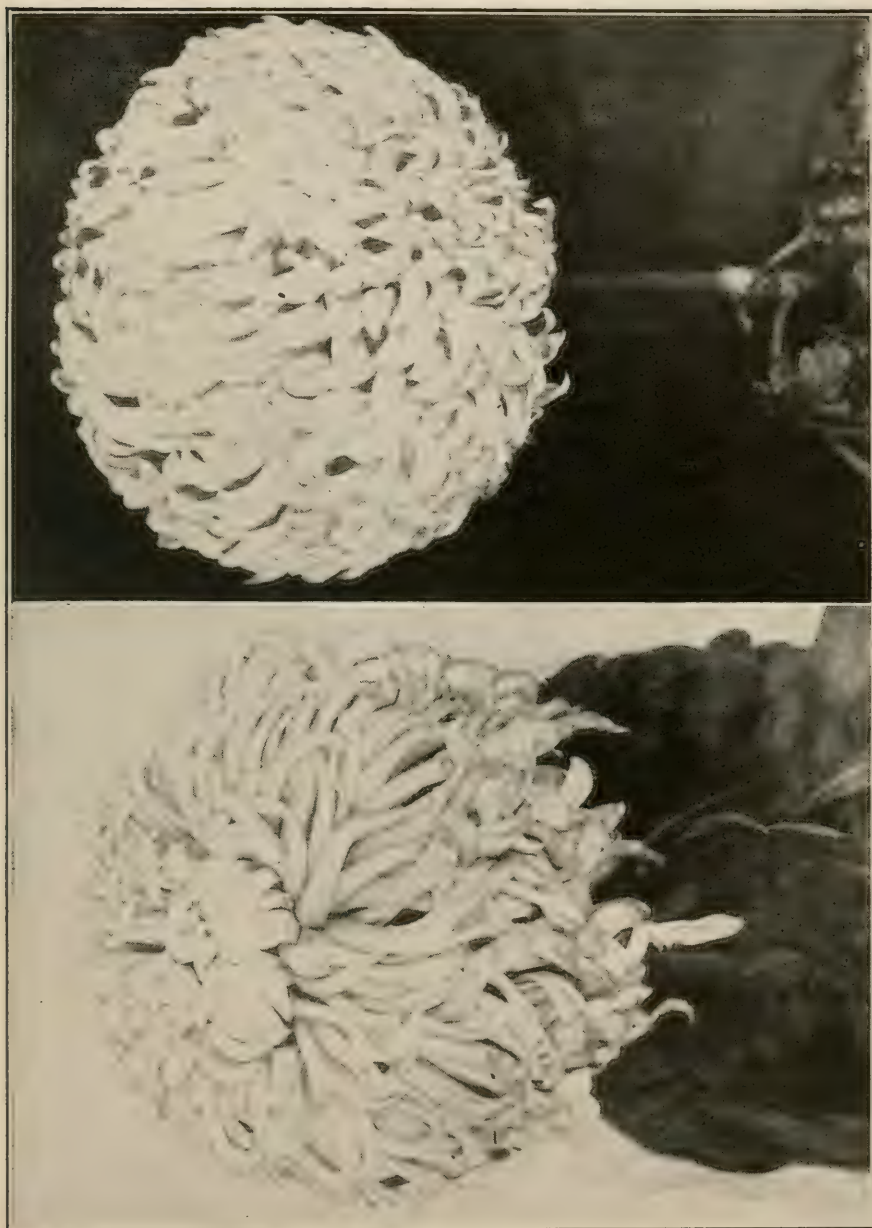
Soil. The Chrysanthemum is not fastidious as to soil, but being a gross feeder at least one-fourth of the bulk of the soil should be of well-rotted cow manure, the remainder, loam. Four or five inches in depth for benches is sufficient, and before the plants are

put in position it is made firm by tramping, or, in the case of side benches, by pounding with a brick. If the soil is dry, give a good watering a day or two before planting. Syringing should be practiced several times daily while the plants are growing; this, together with full ventilation, will provide perfect atmospheric conditions. Watering should not be overdone at any time; the condition of the surface soil will readily suggest when the operation is necessary.

Ventilation. This is a very essential item in the cultivation of the *Chrysanthemum* indoors. To one unacquainted with the exact atmospheric conditions under which the best flowers are grown in a greenhouse, it would seem somewhat strange that a hardy herbaceous plant should be cooped up in a hothouse all Summer; but this is far from being the case, because with abundant ventilation top and bottom, and frequent syringing, the house is kept in a more favorable state for their growth than one would imagine; and in the absence of sun the conditions are much more favorable than outdoors. If there are no means of side ventilation provided, panes of glass above the footpaths should be removed to let in all the air possible. The doors should also be kept open.

Selecting the Bud. There are two kinds of buds, known as "crown" and "terminal." The crown bud appears directly on the end of the shoot, and is naturally the first seen. In some varieties, particularly the early ones, this is the proper bud to select to develop into a flower, but in some well-known kinds growers do not agree as to which is the proper bud to select. There is no doubt, however, that with some soils, also under certain cultural methods, the proper bud to "take" under those conditions would be the wrong one under others. The terminal bud shoots are usually three in number and develop from the axils of the leaves below the crown bud. One of these bud shoots is allowed to remain when a terminal bud is selected, and the other two pinched off together with the crown bud. The terminal bud is the one selected in the large majority of varieties; it consists of the end bud, or that which terminates the selected lateral shoot. Other buds will, in course of time, appear in the axils of the leaves of this shoot; these must also be removed.

Late Flowering Plants. To extend the season of some of the latest flowering varieties till Christmas the cuttings should be taken late, and as soon as rooted kept in a growing condition to prevent the wood getting hard. Growing points of previously potted cuttings make good wood, if they can be kept from wilting during



CHRYSANTHEMUMS

The incurved type.

The Japanese reflexed type.

the rooting process; but this operation is somewhat difficult after the middle of July. Too much shade will cause damping and too little favors wilting, so close observation will be necessary to hit the exact conditions. The single leaf cuttings are easiest to root at this season. If the sand be rough grained and free from foreign material, have the leaf with the under surface lying flat on the sand. Keep the plants shaded for some time after they are planted out. Very short stems are only avoided by supplying conditions favorable to growth.

Specimen Plants. These are not grown so much as they were a few years ago, owing to the demand for pot plants beyond a certain size being very limited. Plants which can be sold at a moderate figure give the best results, and for this purpose they can be grown with very little attention, compared with pot-grown specimens, if they be planted out in the field, and attention given them occasionally during dry weather with water and the cultivator. Pinch to produce bushy plants. The number of times that pinching should be done must be governed by the kind of plant wanted; if only a few stems one pinching may be sufficient. In September the plants should be transferred to suitable sized pots. If protected from the sun and given a moist atmosphere for a few days after the transfer they will show no bad results. Plants for pots are also grown on benches which have been occupied during the Winter by Carnations. They are lifted and potted in time so as not to interfere with the housing of field-grown plants of Carnations. In either case May is early enough to start the plants. Specimen plants of the largest size are started from cuttings as early as December, and from that time on till the end of January. The cuttings should be fairly strong, and either put separately in thumb pots or rooted in the sand bed. The plants must never be allowed to go to rest, and should be kept in healthy vigor from the start. During the Winter a position near the glass, in a house running north and south, suits them well. The best plants are grown in the house from start to finish; but in this case they take a large amount of space.

Insects. The kinds which are troublesome are small in number, but their representatives are numerous enough. There are several species of aphids, which attack the young shoots; these pests must be combated with tobacco in any of its forms. Grasshoppers are also troublesome, and they must be attended to individually. Caterpillars are best prevented from appearing by catching the perfect insects in the shape of moths and butterflies as they appear

in the house. When the eggs hatch hand picking is the only efficacious means of ridding the plants of the caterpillars.

PROPAGATION

Stock Plants. Selected roots for this purpose should be heeled in on the bench of a house where they can be kept cool; a temperature high enough to keep out frost is best. If such accommodation cannot be spared the next best place is a frame around which stable bedding is banked up level with the sash. Give abundance of ventilation in favorable weather and cover the sash when there is danger to the plants from frost.

Propagating for General Crop. The ideal months for this operation are April and May, as then the cuttings are in good condition and the temperature is not too high to make the operation a difficult one. For cutting material the moderately thick shoots should be chosen, avoiding those which are very succulent, or those which are weak and show long spaces between the leaf joints. The short, stocky, soft growths are best, and should be preferred to all others. The early flowered kinds should be given attention first. Put the cuttings in the sand bed, and during the rooting process a high temperature with a stagnant atmosphere should be avoided. When the roots are from one-half to three-quarters of an inch long the cuttings should be potted, as their roots weaken by a longer stay in the sand. Put in thumb pots, using soil a little lighter than the regular potting compost and obtained by adding a small quantity of leaf soil. In this stage keep them in the same temperature as that in which they were rooted until their roots show through the ball of soil. They should then be removed to a coldframe, standing them on a bottom of sifted ashes. As soon as the plants show signs of needing a shift they should be put in 3-inch pots, and as a precaution against hardening of the stems they should be plunged in the ashes, and during excessively warm weather some leaf soil should be thrown over the tops of the pots to help in keeping the roots cool. Planting may be proceeded with by the beginning of June for the early flowering varieties, taking care that the plants are well watered before being knocked out of their pots.

CHRYSLIDOCARPUS (Areca). *C. lutescens* was grown largely as a decorative Palm a few years ago, but owing to its tender nature it has been superseded by the Kentias. It can be easily identified by its yellow stems.

CINERARIA. There is hardly a more showy plant in bloom than a well-grown Cineraria, and few things more wonderful than the color display of several hundred plants in flower, and the thought that they all evolved out of one tiny little package of seed. There is nothing that can be produced with less expense and less trouble. *C. cruenta* is the garden or florists' Cineraria. *C. flore pleno* is a double. *C. stellata* (Star Cineraria) is a beautiful, tall, branching grower which is becoming very popular.

Culture. Keep plants growing vigorously, and do not let them get pot-bound. Use one-half leafmold and one-half fibrous loam until plants are ready for their flowering pots which should be 5 or 6 inches, then give three parts fibrous loam and one part well-decayed cow manure. Keep night temperatures as near 45 degrees as possible. Keep near the glass. Plants should be in their flowering pots at least six weeks before the time they are to begin flowering. This makes compact growth and large, dense flower heads. If not somewhat pot bound, growth will be weaker and flowers few.

Propagation. They are mostly propagated from seed; double varieties are sometimes propagated by cuttings because they do not seed freely. Two or three sowings should be made to insure a succession of bloom, the first about the first of August, the second about the first of September, and a third about September 15. Sow the seed and give the seedlings the same care as for Calceolarias, except that the seeds should be covered to a depth of $\frac{1}{8}$ inch with a mixture of finely sifted leafmold and sharp sand.

After seedlings germinate, sift a little fine, clean sand over the top of the pan. This prevents damping off. Water the same as for Calceolaria seed. As soon as large enough to handle, transplant into thumb pots.

CLIANTHUS (Glory Pea, or Parrot's Bill). *C. Dampieri* is a leguminous plant, hard to surpass as a strikingly beautiful flower. Another species, *C. puniceus*, is often seen in Southern California, but it cannot compare with *C. Dampieri*.

Propagation. *C. puniceus* is very easily raised from seeds, but it seems difficult to get good flowering specimens of *C. Dampieri* on its own roots under cultivation and because of this it is usually inarched upon other members of the legume family, such as the Colutea and Caragana. When grafting it is best to use the seedling Clianthus while in the cotyledon stage. Make a vertical cut in the small seedling stock and with a razor make a slanting cut in the Clianthus seedling stem and place this into the cut in the stock and

tie with a very thin strand of raffia, invert a small drinking glass over the pot, keep moist and the union will be perfect in a few days. When the union is safe the glass is removed gradually. Close atten-



VARIETIES OF CINERARIAS

tion to the needs of the plant will be rewarded by numerous flower racemes within a year.

CÆLOGYNE. The Cælogynes are evergreen. The best forms to grow are *C. cristata*, and its variety, *C. c. var. maxima*, which

bears large flowers. The plants may be grown with Cattleyas. If kept in a healthy condition at the roots this is a very free bloomer. The potting material should be examined after the flowers are gone, and if decayed replace with fresh material. In large specimens this is a tedious operation. As the plants are evergreen, they should never become very dry. A good size for flowering may go into 10-inch pans. By the beginning of June we place our plants under the shade of trees for four months, where they develop splendid growth. Their flowering season is during February and March, and immediately after, the shoots being to push out.

Propagation. The plants of this species are easily divided. New growths sometimes push out not only from the base of last year's pseudo-bulb, but also from those of the two previous seasons.

COCOS. *C. Weddelliana* in a young state is exceedingly ornamental, the leaf divisions being narrow and close together. It will stand a lower temperature than is generally given. Small plants are admirably adapted for the dwelling house. *C. nucifera*, the Cocoanut, is also cultivated in greenhouses. *C. plumosa* is a prominent street tree in California and Florida. (See also Palms.)

CODIÆUM (Croton. Variegated Laurel). The Codiaëum, or Croton, as it is commonly called, is a genus of plants containing almost endless varieties through crossing and selection. It is a foliage plant and is noted for its varied and brilliant markings on the leaves. They are tropical plants and therefore grown only in greenhouses in the North. In the warmer parts of the country it has forged its way to the front as a choice bedding plant and very deservedly so. (See page 283). It is seldom seen as a house plant, one reason being the dry air of houses. Some of the many varieties noted are: Baroness James de Rothschild, Rex, Robert Craig, Maculatum, Queen Victoria, Norwood Beauty, Punctatum.

Culture. They require a night temperature of from 70 to 75 degrees and the air must be kept moist by frequent syringing. The color of the leaves will be enhanced by an increase in the sunlight. They are subject to mealy bugs and red spider and should be sprayed two or three times a week with tobacco water.

Propagation. They may be increased by cuttings of half-ripened wood taken at any time from October until June. A bottom heat of 80 degrees is required.

Ringling Crotons. This simple operation is brought into requisition when it is desired to root the top part of any particularly fine specimen. The stem of the parent plant may be destitute of leaves for a considerable distance above the pot, making the plant comparatively useless as a specimen and only useful as a stock plant. Ringing, if successfully performed, will give an almost perfect plant a foot or so high with large leaves right down to the soil—a condition we can hardly hope for from cuttings. Moreover, the rooted top sends out such a mass of feeding roots that the succeeding growth is not stunted, but continues to make leaves every bit as large as the lowest ones—a condition much to be desired when an evenly built up plant is wanted. Plants, then, should be selected which have good, healthy tops with finely-colored, well-developed leaves, and if the bottom part near the pot has lost its leaves this is the only use to which it can be put. The house in which the operation is performed should be a warm one and shaded from the sun, so that the material used to produce roots will not dry up too quickly. Select those pieces which are dormant or have made their growth, because if plants are taken during the process of making leaves they are bound to carry some disfigurement afterward. The stem at the place to be rooted should be denuded of the leaves for two or three inches of its length, and with a sharp knife remove a small section of the bark; or, just as good, make an incision in the wood upward of about three-quarters of an inch in length, and in depth from one-third to one-half the diameter of the stem. Insert a little sphagnum moss to keep the incision open, then tie a small quantity around it, not too much or it will be apt to keep too wet. After being tied small enough, so that the fingers can easily close on it, stand the plant back in its place and see that the moss does not suffer for want of water, because should this happen the tender tips of the roots will be lost and the process of rooting will to a certain extent have to be begun again.

As soon as the roots show through the moss the plants should be potted, but not potted in the ordinary way. Many pots are broken trying to get plants out of them, but in this case we will have to break pots to get the plants in. Thumb pots are quite large enough for the first shift; and these must be broken into two pieces lengthwise. One-half of one pot and one-half of another will not do, as the pieces must fit closely, therefore break as many pieces as are wanted, and lay the pieces one on top of the other before beginning the operation of potting. Supports must also be supplied, consisting of two sticks, one on each side, and reaching to the mossed part of



CROTON PUNCTATA IN $2\frac{1}{4}$ -, 3- AND $4\frac{1}{2}$ -IN. POTS

Good all around plant, very tough and enduring. Useful for filling in for Christmas baskets.

the stem. On one of the sticks, just about where the middle of the pot will reach, twist a piece of wire, then clasp the moss with the two pieces of pot, twist the wire firmly around these and then on to the other stick. This will keep the pot in position until the time to sever the top from the plant. This condition will be indicated by the roots appearing through the bottoms of the pots. If the tops are not of the largest size they can be cut off and placed in a close frame for a few days before potting on; if, instead, they are large, a further application of material to the mossed part will be necessary. For this purpose 3-inch pots will have to be used, and the material should be fibrous peat, sand and loam, mixed. When the roots show, the tops may be cut off. Stand the pots inside of others of the same size in the frame, until they recover to a certain extent, then pot and keep close for a while longer, gradually giving air.

CORDYLINE (Commonly known as **Dracænas**). There are numerous sorts of Cordyline worthy of culture, the commonest being *C. australis* (*D. indivisa*), a species very useful for the center of hanging baskets and urns because of its long, graceful, arching, grass-like leaves. *C. terminalis* is a broader-leaved species of which there are a number of varieties, namely: *C. t.* var. *ferrea*, a dull purple variegated-leaved sort; *C. t.* *Guilfoylei*, a red, pink and white variegated variety; *C. t.* var. *amabilis*, white and pink variegations; *C. t.* var. *Baptistii*, a broad-leaved sort with deep green, recurved leaves, variegated with a few pink and yellow stripes; *C. t.* var. *Bausei*, broad-leaved, dark green with some white; *C. t.* var. *anerliensis*, a very broad-leaved variety with deep bronze red leaves, variegated slightly white; *C. t.* var. *Youngii*, a deep coppery bronze sort.

Propagation and Culture. The sorts such as *C. australis* and its forms, are best raised from seeds, which are easily procurable. Sow thinly, as they will not require to be transferred during the earlier stages of growth. They are good decorative plants, from 5-inch pot plants up, having long, narrow, strap-shaped, drooping leaves. Small plants are useful for mixing with other subjects in vases and baskets, as they stand full sun. The ornamental-leaved kinds, which need a higher temperature for their perfect development, are very numerous. The *C. terminalis* varieties are best increased by cutting up the long stems into pieces about 3 inches in length; put in warm sand and keep moderately damp. They will throw up shoots from each eye; these should be taken off and put in the sand to form strong, fresh roots, as they are provided, when attached to

the parent stem, only with very weak roots and sometimes none at all. They will root quickly, and may be potted according to their size, in 2- or 3-inch pots, and grown on quickly in a high temperature. When they reach a marketable size the hardening-off process is necessary, or they will not stand long when used for decorating. In *C. neo-caledonica*, *C. t. braziliensis* and *C. t. amabilis* the thickened root stocks may be cut up into pieces along with the stems for propagation. *C. t. cannaefolia* does not succeed so well when cut up into small pieces. It is a splendid decorative plant, standing much rough usage. Moss the tops and afterward place pieces of the stems, at least a foot long, in the bench of a cool house, as they take their own time in sending up growths. The species and forms with highly colored foliage will need a minimum temperature in Winter of at least 55 degrees. The others will succeed with the thermometer 15 degrees lower. With the greenhouse kinds loam should predominate in the potting soil, but the others should get a greater quantity of leaf soil.

COTYLEDON (Echeveria. Hen-and-Chickens). *C. gibbiflora metallica* takes a prominent place among serviceable flowering plants during January and February. It is one which is attractive either in or out of bloom, and its cultivation is unattended by any serious difficulties. *C. fulgens* and *C. coccinea* are also good.

Culture. Keep in a warm house where it is rather dry and not exposed to drip.

Propagation. When done blooming, which will be in a short time, its propagation may be attended to as follows: Take off the top of the main growth with as much stem attached as will enable it, when rooted, to go 2 or 3 inches into the soil; to root them, take as many 4-inch pots as there are tops, stand them on the bench, put a little moss in the bottoms, and then place a cutting in each; this will cause the cut part to callus over without the danger of rotting. In a short time the stems will give out hair-like roots, and when these are from one-half to three-quarters of an inch long, the cuttings may be potted, using soil on the dry side, and kept rather dry until the plants have made roots enough to demand water. On the old stumps rosettes of leaves will form, which in time may be taken off and potted.

CRASSULA (Rochea). The principal member of this small genus of plants, *C. falcata*, is indigenous to the Cape of Good Hope. The foliage is rather peculiar in that the leaves are thick, blunt and

formed somewhat after the shape of a curved knife. The chief attraction lies in the flowers, which are bright scarlet, small, but produced in immense numbers in flat heads.

Culture. Although in Summer it will stand an abundance of water in fully exposed situations, it should be given drier conditions in Winter. It will succeed well enough in a house suitable for Geraniums.

Propagation. The *Crassula* is a slow-growing plant, consequently getting up a stock is a tedious process. The tips of the shoots make the finest plants, and the pieces of the stem next the place where the tip has been taken off can be utilized for as much of its length as will be safe to enable it to break out again. For leaf cuttings the leaves must be cut off cleanly and put in sand, much in the same way as *Cotyledons*, only a little more heat should be given during the rooting process. Encourage old plants to send out small growths along the old stems by taking out the tips and keeping the plants perfectly dry for a time. As soon as they begin to break, water may be gradually supplied.

CURCULIGO. From the general appearance of the foliage one would suppose that these plants were members of the Palm family instead of being related to the *Amaryllis*. The leaves resemble the undivided leaves of *Cocos flexuosa*. *C. recurvata* is the only species grown. The form with variegated leaves is one of our handsomest variegated plants.

Culture. During growth they require stove temperature for their perfect development. They stand in a dwelling house fairly well. Almost any kind of soil will answer; but as the plants need large quantities of water the drainage should be perfect.

Propagation. They are increased by division. If the pieces are placed in sand in the propagating house before potting they will root rapidly.

CYCAS (Sago Palm). The *Cycas* is a most attractive Palm-like plant found in most conservatories.

Culture. *Cycas revoluta* stems are often shipped in a dormant state. They require careful treatment when they are potted. Having few or no roots they should not be placed in large receptacles, as the soil when once watered takes too long a time to dry out, and is apt to become sour, which is anything but a favorable condition to tempt the growth of fresh roots. Put the stems into as small pots as they will go, leaving just enough space to ram the soil

tightly around them with a thin piece of wood. They will start into growth best when in a warm, moist house, and require little water until they show signs of sending up a crop of leaves. Plants of this class make their annual crop of leaves, not one after the other, as is the case with Palms, but simultaneously, and at this period they require close watching so that the foliage may be prevented from being deformed in any way from insect attacks, cold drafts, or coming in contact with other things during development. The temperature should be higher at this period than at any other. When roots are formed and a sufficient time has elapsed after the development of the fronds, the plants may be given larger pots. A minimum temperature of 50 degrees will suffice during Winter.

Propagation. They are usually propagated by seeds. Sow in the bench or in shallow boxes and cover lightly with sand. After the seeds have germinated, pot in light, moderately rich soil.

CYCLAMEN. The commercial Cyclamens are varieties of *C. persicum*. The Giganteum strains produce larger flowers than the type, but fewer of them. Crested forms variously called Butterfly hybrids and Rococo varieties.

Culture. The soil should consist of loam mixed with lesser quantities of old manure and leafmold; a little sand and crushed charcoal will help to keep the mass in a porous condition. In potting, the corm, or swollen stem, may be half buried in the soil; careful drainage is necessary. As soon as there is danger from frost the plants are removed indoors; and to give good, stiff stalks to the flowers full light and an abundance of air should be afforded on all favorable occasions.

Propagation. Cyclamen seeds, to insure even germinating, should be sown as soon as convenient after ripening. The seeds ripen from April to June. The sowing season is from September to the beginning of December, and the seeds, between the harvesting and sowing periods, should be kept in an open-mouthed bottle, mixed with dry sand. Although the seed may be held for years it loses in vitality the longer it is kept. To have plants in bloom by Christmas the seedlings will consume from 12 to 14 months in completing their growth, and during that period they should never be allowed to rest by withholding water, or be subjected to other conditions unfavorable to continuous growth. The seed should be sown in shallow pans or boxes, in light, sandy soil, and covered to very little more than their own depth with finely sifted soil and sphagnum, two parts of the former to one of the latter. The swollen root-stock



CYCLAMEN

is formed before the first leaf makes its appearance, and when the first leaf is fully developed the seedlings are ready for pricking off. During this process a minimum temperature of 55 degrees will be sufficient. The seedlings may be put directly into thumb pots, pricked off around the sides of 4- or 5-inch pots, or into shallow boxes, keeping them at all times near the light, and in as uniform a state of moisture at the roots as possible. By the middle of May those in the most advanced stages of growth should be in 4-inch pots. At this time they should get the full light from the north side of a house, the plants being placed on inverted pots, and as near the glass as possible. The glass on the south side should be shaded. For Summer quarters frames are the best. The bottom should have a

few inches of ashes to retain moisture. The sash may be raised a few inches above the woodwork by running pieces of wood along top and bottom. The best shading device is probably a piece of cloth fixed to a roller, so that it may easily be stretched over the glass during the hottest part of the day, or the glass may be covered with one of the shading mixtures. Heavy rains should not strike the plants, but they will be benefited by removing the sash in the evenings, replacing them as the temperature gets too warm the following morning. Greenfly, the Cyclamen's greatest insect enemy, may be removed by periodical syringings, or by scattering tobacco stems among the pots. The plants should be repotted when necessary, the very latest ones getting their last transfer about the 1st of November, the earliest plants at least a month sooner. Well-developed specimens should easily fill an 8-inch pan.

CYPRIPEDIUM (Lady's Slipper Orchid). These sorts are terrestrial and mostly evergreen (our native species being herbaceous). The evergreen kinds need copious supplies of water while growing, and even during the resting season they should not be allowed to get dry. They may be grown largely in peat and sphagnum. *C. insigne*, the one most frequently met with, is best grown cool. It should be kept outdoors during Summer, and to retard the flowering period may be kept in well-aired frames until there is danger from frost. *C. Spicerianum* requires a warm temperature, flowering in early Spring.

CYTISUS (Broom, Genista). Several forms are grown for mid-Spring and Easter flowering.

Culture. Frequent syringings are necessary to combat the attack of red spider. Pinch back the strong growths as soon as they show a tendency to outgrow the others. Keep cool during Autumn and the early Winter months. After January they may be transferred gradually in a warmer house for forcing.

Propagation. Cuttings are rooted in February. They may also be increased by seeds and layers. The young plants may be grown in frames.

DALECHAMPIA. This plant belongs to the same family as the Poinsettia, and, like it, is grown solely on account of its bracts, which are rose colored. *D. Roezliana* is the only species cultivated.

Culture. It is a warm house plant, but may be plunged outside in Summer to make abundant growth. Use a sandy peat soil with good drainage.

Propagation. By cuttings.

DAPHNE. One of the most popular of the greenhouse species is *Daphne odora*. The odor of the flowers is very pleasing to most people. There are several varieties, differing from one another in the colors of the flowers. They are Winter blooming and highly prized everywhere. The commoner species do fairly well in Washington when protected from late frosts. They grow better much farther north than at Washington.

Culture. Give them a sandy compost of peat and loam; provide good drainage and water carefully during the Winter.

Propagation. By cuttings of the ripened wood, placed in sand.

DENDROBIUM. *D. nobile* is one of the oldest and easiest grown of the species. *D. formosum* is an evergreen and requires heat. *D. Phalenopsis* is one of the finest for cutting, giving long stems without injuring the plant.

DESMODIUM (Tick Trefoil). *D. gyrans* is a plant of little beauty, but very interesting because of the movements of its lateral leaflets, which are continuous in the higher temperatures. For public greenhouses and when properly labeled it would interest most persons.

Culture. It is easy of culture.

Propagation. Seeds or cuttings in a warm house.

DICHORISANDRA. Of the Tradescantia family, *Dichorisandra thrysiflora* is usually grown as a stove plant. In this capacity, unless given abundant root room, the flowers are not produced in abundance. South of Philadelphia it may be used as a choice subject for the open border in Summer. The flowers, of a rich dark blue and the stamens yellow, are borne on the upright shoots of the current year's growth, which is about 2 feet in height.

Culture. Requires little attention after it has become well-established. Repot carefully every year until about an 8-inch pot is filled with roots. It forms one strong shoot each year which after blooming dies down; water should be withdrawn gradually at this time. Give plenty of water during the growing season.

Propagation. In August and September the flowering shoots may be cut in pieces, with a single leaf to each if necessary, and rooted in the hot propagating bed. They may be kept in a semi-dormant state during the Winter, as the plants will form thick tuber-like roots.

DICHROA (Adamia). The *Dichroa cyanea* is a tender plant of the Hydrangea family, with bright lilac flowers and berries. It

is not quite as floriferous as the Hydrangeas, and is only hardy in the South. As a greenhouse plant we should grow more of it.

Propagation. Increased by cuttings taken from the ripened growths.

DIEFFENBACHIA. Among the numerous species there are a few worthy of cultivation in the warm house, *D. Baraquiniana*, *Jenmanii*, *Veitchii*, *Bausei* and *grandis* being among the best. They will not stand much rough usage, being somewhat soft in the foliage; they are, however, easily propagated.

Culture. They prefer a porous soil, one containing some chopped sphagnum moss. Give a high and moist atmosphere.

Propagation. Some of the old plants of these ornamental aroids will, by the end of Summer, have grown lanky, bending over the pots, with only a few leaves terminating the stem. Take the tops off and put them in the sand bed; lay the stems aside in a warm, airy place to dry for three or four days, then cut them into lengths of about 2 inches. Lay these aside to dry for a similar period, first rolling them in powdered charcoal to lessen the danger of decay. Put in a box of nearly dry sand, cover over about an inch and stand on the floor of a warm house. When a few small leaves have been made to each sprout, pot in a mixture containing at least one-third of its bulk of chopped sphagnum moss; keep warm and moist. The tops, as soon as fairly well rooted, should be potted, not in ordinary soil, but in a mixture of chopped sphagnum, manure, leafmold and sand. In this mixture the roots fairly revel, provided a strong, moist heat is given. In potting Dieffenbachias put them into as small pots as possible, and when a shift is necessary they may be placed three together in a pot, making a well furnished appearance in a comparatively short time.

DIONÆA (Venus' Fly-trap). The most intensely interesting of the insectivorous plants is perhaps *Dionæa muscipula*. This plant is grown in greenhouses all over the world where suitable conditions are available and never fails to rivet the attention of the beholder when its peculiarities are pointed out. It is probably the most peculiar plant in the world as it lures, catches, kills, and practically eats insects by means of the little traplike modifications of the leaves. The traps are so arranged that it is impossible to devise any mechanical scheme to entrap flies and other insects with greater certainty than this denizen of the swamps of North Carolina.

Culture. Unfortunately, it has been somewhat difficult to grow in greenhouses or anywhere outside of its native habitat in North Carolina. It will not grow under conditions which suit the *Sarracenia*, *Cephalotus*, *Darlingtonia*, and the Sundews. But we can now grow the *Dionæa* under cultivation so that specimens can be produced which give larger "traps" than can be found in its native haunts. The secret lies in growing the plants in glass pots, in shape just like ordinary flower pots, with a hole in the bottom. One would think the glass pots would be anything but favorable to the growth of this plant, but we have had the same plants growing splendidly for several years. The reason is that in a peaty substance, together with sand and chopped sphagnum moss, when small pieces of broken pots are used, the lower vegetable organisms start growing on the inner side of the pot and they keep on growing instead of dying, as they would do in an earthenware pot. Someone may ask how we know that the health of the plant is occasioned by the low vegetation around the ball of the plant. It has been proved in this way: Take several thicknesses of dark paper and wrap it around the outer part of the glass pot to exclude light; in a short time the low forms of vegetation will die and the *Dionæa* will soon behave like it does in ordinary flower pots—it will keep in healthy growth only for a comparatively short period, while those in the glass pots which are exposed to the light are always healthy.

Propagation. Seeds can be made to germinate under a bell-jar on a moist, sandy soil which contains finely chopped sphagnum moss.

DRACÆNA. Certain plants known as *Dracænas* are found under *Cordyline*. There are a great number of species of *Dracæna* cultivated, and especially *D. Godseffiana*, *D. fragrans*, *D. Goldieana* and *D. Sanderiana*. There are a number of varieties of *D. fragrans* well worthy of culture, namely: *D. Rothiana*, *D. Victoria*, *D. Lindenii*, and *D. Massangeana*. *D. fragrans*, the most useful of the genus, grows 12 feet high, but small specimens are well furnished with leaves. The plants will stand much rough usage. *D. Lindenii* and *D. Massangeana*, variegated forms. In propagating, when the stems have leaves, cut into lengths with a leaf or two to each, and root like ordinary cuttings. These make stock plants. Long, leafless stems should be cut into lengths of about a foot and buried in warm sand and moss. They sprout freely; the sprouts should be taken off and rooted afresh before potting. The plants need slight shade in Summer. All three require abundant root room and well enriched porous soil, otherwise they will show a sickly yellow hue

on the leaves. *D. Godseffiana* is a plant with short leaves, somewhat resembling in shape and coloring those of the old *D. phrynoides*. *D. Godseffiana*, however, has the markings lighter. When planted out in Summer, and well supplied with water, it makes considerable growth. Every small twig may be rooted. Perhaps the best use to which it may be put is in association with small ferns in pans. *D. Sanderiana* will never occupy a very important place among decorative plants, because single plants do not make much of a show in 5- or 6-inch pots. On account of its variegated foliage and slender habit it can be used among ferns and mosses for jardinière work. Pieces of the stem with two or three leaves attached root quickly with bottom heat. If wanted for filling pots above 5 inches, three or four must be potted together. *D. Goldieana* is a handsome stove plant with short, broad leaves, irregularly marbled with dark green and dull white. Tops may be rooted and the canes left to sprout; or they may be cut up, sprouted and rooted, as in the case of *Cordyline terminalis*.

DROSERA. The finest of all the Sundews, *Drosera binata* is a native of Australia, growing about 1 foot in height. This is an exceedingly attractive plant for private greenhouses. In early Spring the leaves catch myriads of male greenfly, and the plant may be regarded as a friend of the horticulturist.

Culture. It will succeed in a cool greenhouse. Give soil same as recommended for *Nepenthes*, covering with live moss.

Propagation. This may be accomplished by seeds, division of the shoots, or cutting the rhizomes into pieces $\frac{1}{2}$ to 1 inch long.

EPIPHYLLUMS (Christmas Cactus). Epiphyllums are usually grown as standards; that is, grafted on the stems of other plants. This method is necessary because the branches have a procumbent habit when the plants are on their own roots. Rooted cuttings may be grown to a fair size and used in baskets or other hanging receptacles. The species, three in number, and the numerous varieties make very handsome Winter-flowering plants.

Culture. (See Cactus).

Propagation. The stocks for grafting are usually *Pereskia aculeata* and *P. grandiflora*. The latter is the more robust grower, and therefore most suitable for tall specimens, *P. aculeata* being used for dwarf ones. Cuttings of the *Pereskias*, which, of course, belong to the Cactus tribe, may be rooted any time after the wood is fairly ripe. They may be put in a dry and warm part of the



DRACÆNA SANDERIANA
FOUR PLANTS IN A 6-IN. PAN

propagating bed, and given water only after they show signs of sending out roots. To graft, select stock in which the wood is sufficiently firm; cut off the top part, make a cut down the center for three-quarters of an inch or so, then insert a piece of the ripened growth of the Epiphyllum, and run one of the Pereskia spines through the whole to keep it firmly together, or tie with raffia until the union is completed. This will be effected in a few weeks in a good growing temperature. Have the Pereskias in as small pots as possible at the time of grafting, so that when the union between stock and cion takes place the plants will start growing quickly by being shifted into larger pots. The potting mixture should be very porous, as the least stagnation is fatal to the roots. Sandy loam, broken brick, old manure and a little leaf soil will be found best.

ERANTHEMUM. One of our brightest blue flowers in the greenhouse during late Winter is *Eranthemum pulchellum*.

Culture. After blooming discard all plants not wanted for cuttings. Old plants become loose and weedy unless well cut back.

Propagation. Put in cuttings during early Spring; plant in the open border as soon as weather permits, lift and pot in the Fall. Splendid specimens may thus be secured for Winter bloom.

ERICA (Heath). Several years ago the growing of these plants in this country for commercial purposes was regarded as an impossibility, even by those who were familiar with their culture in Europe. But now, some of the kinds are grown here as well as anywhere, simply by studying their needs, and carefully attending to their wants. *E. persoluta*, *E. melanthera*, *E. gracilis* and *E. hyemalis* are a few of the very many kinds grown.

Culture. During the Summer months keep the roots cool by plunging the plants in some porous material, never allowing them to get too wet or too dry. It may be stated here that roots of plants are divided into four classes—nutritive, attachment, contractile and storage. In the *Ericas* the nutritive roots are most abundant next the flower pot, so that an equable condition of moisture is necessary to their existence. Avoid manure of any description.

Propagation Propagation of the several varieties may be effected during April before the active growth of the season gets too far advanced. Have no undesirable vegetable humus or mud in the sand. Secure a good-sized bucket, fill with sand and push the end of the hose to the bottom, allowing the water to run with considerable force for a few minutes. This will clean the sand of all impurities. Pans or pots for the cuttings should have perfect drainage to within 2 or 3 inches from the surface; give about an inch of peat or leafmold and sand at the bottom, covering with an inch or so of sand, which should be made firm. Keep close under glass while rooting at a temperature never above 60 degrees F.

ERYTHRINA (Coral Tree). The herbaceous species of *Erythrina* are not ornamental when not in flower. *E. Crista-galli* and the variety *E. laurifolia*, together with *E. Hendersoni*, are the best for outdoor culture. The woody sorts, *E. Parcellii* and *E. marmorata*, both varieties of *E. indica*, have variegated foliage and are greenhouse plants.

Culture They are best placed in coldframes for the Winter and should get a mulching of stable litter to keep their roots snug. In the colder parts of the country the covering should extend a foot or more up the stems, so that there will be no danger from freezing. So treated they bloom nicely in Summer. In pruning leave as much of the stem as possible, only cutting off enough to enable the sash



ERICA MELANTHERA

to slide into place. Old plants which have been bedded out for the Summer will winter all right beneath a bench, in a cold house, with some soil thrown over the roots.

Propagation. By the beginning of February start some of the old plants of *E. Crista-galli*, or any of its forms; they are far the best for Summer work. If not in pots the old stumps may simply be covered over at the roots with moss and given a minimum temperature of 55 degrees. Syringe occasionally to encourage growths for cuttings. As soon as these growths are in the neighborhood of 4 inches in length take them off with a heel, put in 2-inch pots, using a sandy mixture, and keep them confined in a warm propagating case until they root; shift into larger pots and gradually harden off.

EUPATORIUM. A white species, *Eupatorium probum*, of this popular Winter flowering genus may be grown to come in after the well-known *Stevia serrata* goes out of flower. The flower heads are as large as those of *S. elegans*. The only drawback to its use as a cut flower is the clammy or viscid nature of the stems and leaves. The plant is said to be a native of Peru; it was introduced nearly forty years ago, but has never become popular, supposedly from its being confined to European gardens ever since. Two desirable Winter bloomers with dark lilac or purple flowers are known as *E. ianthinum* and *E. macrophyllum*. They are of little service for cutting. Plant out in late Spring after they are done flowering. This will give good material for cuttings in September. *E. macrophyllum* is the stronger of the two.

Culture. Give same treatment as for Piqueria (*Stevia*).

Propagation. Cuttings grown on in a warm, sunny house will fill 5-inch pots by the first of March, and have very large panicles of flowers.

EUPHORBIA (Poinsettia). Poinsettias are grown not on account of the flowers, which are small and inconspicuous, but for the highly colored bracts which surround them. The flowers are produced in mid-Winter. Both for cutting and as pot plants Poinsettias are highly popular. There are four kinds of Poinsettias in cultivation—*E. pulcherrima*, which is most commonly grown; *E. p. plenissima*, having a larger number of bracts; *E. p. alba*, with creamy white bracts, and a pink sort. Several other Euphorbias are grown in greenhouses, namely, *E. fulgens* (*jacquiniaeflora*), a small-flowered, brilliant scarlet form; *E. splendens*, The Crown of Thorns, a cactus-like appearing plant; and a number of other sorts grown for oddity rather than beauty.

Culture. Plants rooted during mid-Summer from green cuttings may be grown on benches, much in the same way as single-stemmed Chrysanthemums are grown. Before the approach of cool weather all the plants should be removed indoors, as they will lose their leaves on being subjected to low temperatures. The wilting of the flowers of Poinsettias, or rather of the gaudy colored bracts which surround the flowers, is due to the milky sap secreted from the cut part. This hardens to a greater or less extent, and clogs up the vessels through which the water should ascend to keep the flowers and foliage fresh. A good way to circumvent this is as follows: Some little time after the stems have been cut and a goodly quantity of the milky sap has run out, cut off a small piece from the end of the stem and stand the cut ends in warm water for a few minutes. This will leave the cut part free to absorb all the water necessary for their support. Blooms which have been drooping for a considerable time may be revived in the same way. When the pots in which they are to bloom get full of roots clear liquid manure may be given with good effect. The pots of *E. pulcherrima* should be thoroughly rested after blooming by placing the pots on their sides and letting them get dry. *E. fulgens* should never be allowed to become completely dormant. .

Propagation. The kinds are propagated in two ways, from dormant wood and from green cuttings. In employing the former method the old plants, after the flowers have been cut, or in the case of pot plants, after the flowers have decayed, the stems should be allowed to ripen thoroughly, by gradually withholding water and subsequently placing them beneath the stage of a warm house; while there they should be kept free from moisture at the roots. During March the canes which can be spared should be taken off and cut into lengths of about 4 inches. After the milky sap has stopped exuding from the lower part of the cuttings, they should be washed in warm water and dipped in powdered charcoal previous to being placed in the warm propagating bed. While rooting the sand should be kept on the dry side, only giving enough water so that the roots will obtain sufficient nourishment. Instead of being allowed to make long, spindling roots in the sand they should be potted in thumb pots immediately the roots appear. Put a small quantity of rough screenings in the bottom of each pot, and have the soil (loam and sand in equal parts is best) in a fairly moist condition, so that a very slight sprinkling through a fine rose will suffice for the first few days.

When green cuttings are preferred the plants may be started into growth after the end of April. Shake the soil from the roots and repot in rather small pots. In removing the old soil it will be found that the nutritive roots are decayed and only the storage roots remain. On coming into contact with moist soil these storage roots speedily send out feeding roots, followed by the expansion of the dormant buds on the canes. When the growths are a few inches long they may be taken off with a heel, potted singly and put in a close frame; or simply rooted in the sand bed and potted when roots are formed. If kept growing without a check plants from green cuttings will give the largest heads of bracts. Batches of cuttings may be put in at intervals during the Summer. When well started in pots



POINSETTIA

all the plants may be placed in a sheltered position out of doors, but in the full sun.

Euphorbia fulgens (better known as *E. jacquiniæflora*) is less easy to manage than the Poinsettia. A start should be made with soft cuttings, with a heel or piece of the old wood attached. They should be put in the open propagating bed instead of a frame, as their leaves are very liable to decay, owing to the dampness. Place in 2-inch pots and gradually shift on, keeping the plants in the full sun. Too much water at the root should be guarded against. After mid-Summer the plants may be plunged in an open frame to ripen their growth, and removed indoors before the weather shows signs of getting cool.

EURYA. A plant useful for decorating though rarely seen is *Eurya latifolia* var. *variegata*.

Culture. Give the same treatment in Summer as recommended for *Araucaria*.

Propagation. Put in cuttings about the same time as *Azaleas*.

EXACUM. A compact, bushy annual, Gentian-wort, *Exacum affine* gives a very good account of itself for Winter flowering in a moderately warm house. The flowers are bluish purple with yellow stamens protruding from the center of the flower. It does not have the provoking habit of some of the *Gentians* in closing its flowers during the latter part of the day.

Culture. Give warm conditions in Winter; and in Summer keep in a cool house with no draft. Shade plants from intense sunlight.

Propagation. Seed sown beginning of July will make fine plants by the Fall. As soon as the seedlings are large enough they may be plunged in a frame, where they will need but little attention, as they do not suffer from an occasional drying out. It may also be propagated by cuttings.

FATSIA (Aralia. Rice Paper Plant). In this latitude the plants of *F. papyrifera* are annually killed to the ground, but they send up shoots in Spring from the roots which grow very rapidly, making very attractive growths, sometimes 6 feet high, so that it may be treated as an herbaceous plant instead of a shrub, which it really is in its native country and in localities with mild Winters. Its habit of growth resembles to a certain extent that of the Castor Bean, but the plant is furnished with leaves and retains them from the ground up all through the season.

Propagation. The method of increase is by cutting the roots in pieces 2 or 3 inches long. The operation may be performed any time late in Fall, or very early in Spring. The roots should be put in boxes of soil and started into growth in a greenhouse about the beginning of March. When potted they may be put in a coldframe early. (See also page 295.)

FELICIA (*Agathæa*. **Blue Daisy**). A cool, greenhouse, low-growing shrub with blue, Daisy-like flowers produced principally in Winter.

Culture. Grown like the *Cineraria* or, if propagated from Spring cuttings, like a *Chrysanthemum*. It will stand full sun at all seasons.

Propagation. Cuttings should be taken from the soft wood in Fall and Spring and will flower quickly.

FICUS. *Ficus elastica* (Rubber Plant) is one of the most popular house plants, and one of the most suitable for this purpose. The leaves are large and leathery and not easily hurt through occasional neglect. Complaints are sometimes made of plants losing their lower leaves; in old plants this is natural, as evergreen plants have their season of leaf shedding. Young plants will lose leaves through insufficient or too much moisture or lack of nourishment. *F. pandurata* has distinctive fiddle-shaped or banjo-shaped leaves, often a foot long. It is quite widely grown. *F. repens* is a trailing sort useful for the walls of the conservatory or as a house plant.

Culture. Due to the fact that this is a very tough and thrifty plant, its culture is very easy. It can be grown very well both as a house plant and as a conservatory plant with very little care.

Propagation. For stock plants indoors reserve a place at the end of a warm house for large, over-grown plants. They make quicker growth indoors during the warm months than they do outside, and for the purposes of single-eye cuttings, the wood is preferable, as the spaces between the leaves are longer. They should be planted in a solid bed. If the old soil be unsuitable remove it to a depth of about 18 inches; put some broken brick, clinkers or stones in the bottom for drainage, some old leaves on top of this, and fill up with rich, porous soil. Plant moderately close together, pruning back those which require it; with a few good stock plants a plentiful supply of growth for cuttings, or for mossing, will be the result. The Rubber when well grown can always be depended upon as a ready selling plant.

Between old stocks of Rubbers planted outside and those kept in pots there is quite a difference in the quality of growth. Those given unlimited root room in the open lot have a somewhat succulent growth with the leaves far apart, and altogether not in the best condition for purposes of propagation. These may merely be notched below every second leaf previous to inserting in the sand bed later on. Plants growing in pots or tubs have much firmer growth, well ripened, with the leaves quite close together; very suitable for providing tops which may be rooted in large pieces and make salable plants in a short time. To go about this operation successfully make preparations during the first half of August by tying the growths to supports. Those which answer the purpose best are pieces of wire stakes tied along the stem, then at the point where it is desired to root the pieces remove just enough of the leaves and make an incision in the stem upward toward the growing point. Insert a little sphagnum moss, wait a day or so, remove the moss; bathe with warm water to remove the congealed sap, which, if left, will hinder a complete callusing of the cut part. Insert fresh moss and tie a handful over the incision; keep moist until the roots are showing through. The pieces should then be cut off, put in small pots and placed in a close structure for a few days until the roots begin to take with the soil. Syringe only during that period. This is a very important point. After potting either mossed shoots or cuttings (if the soil is in a good working condition; that is, neither too wet nor dry) absolutely no water should be given for a day or two; the atmosphere kept moist, and an occasional syringing will be all that is necessary.

Cuttings root poorly sometimes, and there are several causes. Single-eye pieces are dibbled in an open bed with the leaf pierced by a stick to keep it in an upright position. During the process of rooting the cutting is nourished to a large extent by the moisture taken in by the under part of the leaf; that is, when it lies flat on the sand, which it should do. They will in this position root quicker and better. Another cause of frequent failure is in taking the cuttings at the wrong time. The plants have a period of rest and a period of growth. When a shoot is in the process of developing a leaf rooting should not be attempted; better wait till every part is ripened, then rooting is an easy matter. In potting off do not allow the roots to get beyond an inch in length while in the bed. They sustain injury easily when coming in contact with anything. In lifting from the bed place the cuttings in a box with the rooted ends resting on one side of the box, and not too many of them to-



PRIMULA MALACOIDES

One of the daintiest lavender flowered sorts, commonly known as the Fairy Primrose.
See page 149

gether. Use soil of the same temperature as the sand. Two-thirds loam and one-third sand is a good medium to start with; 3-inch pots should be used. A shift will be necessary within three weeks.

FITTONIA. In public conservatories where potted plants are growing on benches the space beneath the benches is usually very unattractive, but this can be changed so that the space would be more ornamental all the year round. The drip from the stages is quite sufficient to keep these and other plants, such as *Selaginellas*, in fine condition, thus changing the space from an eyesore to a beauty spot. Two of the varieties grown are *F. argyroneura*, which has green leaves and white veins, and *F. Pearcei*, with red veins.

Culture. Fittonias grow very easily and may be used as a cover in almost any part of the house; they are especially good in shaded parts. Never let the temperature go below 55 degrees.

Propagation. They are increased by cuttings and the best time is in early Spring. Pot in 2-inch pots in loam. leafmold and sand.

FUCHSIA. These well-known flowering plants for the greenhouse and conservatory bloom in early Spring. There are many single and double varieties.

Culture. Fuchsias will bloom in 3-inch pots, but by keeping them in a growing state, with abundant root room, they can easily be grown, according to the variety, from 2½ to 4 feet in height, before the flower buds make their appearance. If wanted to bloom in 5-inch pots, pinch back the leading shoots, and when the pot is well filled with roots give weak liquid manure frequently. This will prolong their blooming season. A single supporting stick for the main stem will be all that is necessary, with perhaps a few supporting strings for the lateral shoots in the case of those varieties having large, double flowers.

Propagation. Old plants of Fuchsias should be started by the middle of December to provide wood for cuttings. The plants should be knocked out of their flowering pots, the balls reduced and given fresh soil. Place them in heat and syringe freely. The growths for cuttings will start almost immediately. Do not take growths for cuttings which have been on the plants all Winter, as the wood is bound to be a trifle hard and does not turn out the best plants; better wait till the growths are tender enough. Even young growth, with the wood on the hard side, does not make good cuttings. These should be taken off during the period of fairly rapid

growth and kept growing, or they will be apt to remain stunted and come into flower before the plant is fully developed.

FURCRÆA. A genus of plants closely allied to the Agaves. There are about ten species in cultivation; those most commonly seen are *F. cubensis*, *F. gigantea* and *F. longæva*. The variegated form of *F. gigantea* is an exceedingly handsome subject.

Culture. They thrive with a little more heat than is usually given Century Plants, otherwise their cultivation is nearly the same.

Propagation. They are easily increased from the large number of bulbs produced while in flower.

GARDENIA (Cape Jessamine). Within recent years the *Gardenia jasminoides* has come rapidly into popular favor. Years ago this plant was altogether grown in private establishments, usually in very large pots or tubs. As a rule its cultivation was not as successful as it is today by the bench system; the plants were formerly favorite breeding places for mealy bug and scale insects, and except in rare instances they did not pay for the trouble bestowed on them. The successful method of treatment accorded to this plant at the present time is much the same as that given to Roses on benches.

Culture. The soil best adapted to their requirements does not materially differ from that which is best suited to Roses. The soil should not be over 4 inches in depth. Exposure to light is one of the main requisites. The atmosphere should be more moist than that usually given Roses. Weak manure water should be given every two weeks. The fertilizer known as Scotch soot seems to work wonders with this plant. It is scattered on the surface of the bed once every two weeks, the quantity being about a thumb potful to every square foot of surface. However, there is danger of overfeeding during dull weather. The first lot of flowers may be expected early in October, with the heaviest crop about the end of the year. Each plant may be expected to give about ten flowers when the plants are about 14 inches apart. A southern exposure is desirable to prevent rank growth and to firm the wood. Long stems to the flowers are assured by removing the growth in the axils of the leaves when the plants are in the beds. The essentials are: Do not overwater, do not overfeed, have the minimum temperature about 65 degrees F., keep the plants free from insects. Longer stems are secured and flower buds laid down by removing the growth in the

axils of the leaves when plants are making growth. Syringe frequently, keeping the atmosphere on the humid side. Keep down insect pests by frequent fumigations.

Propagation. Old plants, however, should never be grown, as they are prone to give flowers with short stems, while plants propagated annually give long stems and more flowers to the square foot of space. The best time to put in the cuttings is from the last half of February to the middle of March. The temperature of the propagating house should run from 65 to 70 degrees at night with a bottom heat of at least 75 degrees. Wood for cuttings should be selected which is moderately firm. From the terminal bud to the base the cutting should be about $2\frac{1}{2}$ inches long; the sand should be sharp and free from impurities. In from two to three weeks the cuttings will have formed a sufficient quantity of roots; they are then potted in $2\frac{1}{2}$ -inch pots and subsequently placed in 4-inch, from which size they are planted out in the benches in June. It is essential that the plants be kept growing right along from the rooted cutting to the flowering period.

GERBERA (The Transvaal Daisy). This beautiful *Acanthus*-leaved Daisy, *Gerbera Jamesoni*, was introduced from the Transvaal, South Africa. The flowers are large and range in color from pure white to yellow, orange, pink, scarlet, crimson and violet. The flowers are often borne upon 20-inch stems and last for several weeks without losing their brilliance.

Culture. The forcing is very simple, being similar to that of Lily of the Valley. The roots are trimmed down to 20 inches and the plants are set close together into boxes or deep pots filled with porous soil. The chief requirements are good bottom heat, sunlight, not too much humidity and good ventilation. The buds develop within two weeks, and after another week the first blooms may be cut; while these are not very large, they increase in size as the plant continues to grow. After the forcing, the Gerberas are again planted into outdoor beds and, if strong enough, can be divided in the Fall and again forced.

Propagation. An important consideration in the culture is the fact that *Gerbera* seed retains its vitality for about three, or the most four months. If the seed can be obtained in the Spring, it should be sown at once and covered, with glass. When large enough the seedlings are transplanted into small pots and from them to the open ground when weather permits. They will bloom in the Sum-

mer. They can be repotted in the Fall and wintered in a cool house or forced.

GLOXINIA. The flowers of the Gloxinia (*Sinningia speciosa*) are large, rich blooms of many different colors and shades. The foliage also is beautiful and the plant as a whole makes a valuable addition to the warm house during Fall and early Winter.

Culture. The Gloxinia is fond of leaf soil, and it may be used to the extent of one-half the bulk, loam, sand and cow manure making up the balance. They are not deep-rooting plants. Large seed pans should be provided for the full-sized tubers. Watering should be given the greatest care not only in the seedling stage but at all times of the year. The foliage should never be allowed to become wet. The plants are liable to have small brownish spots appear upon the foliage as if it had been burned by the sun. The spots gradually enlarge until the health of the plant suffers to such an extent as to stop the growth of the flower buds. Probably careless watering at the roots has something to do with the trouble. Each plant should be examined at least once a day, because the broad leaves lying over the surface of the soil are apt to hide a very dry ball; and if the plants go without water for any length of time when dry their usefulness is ended. They require an abundance of air while blooming and must be shaded from sunlight. After blooming, the leaves will ripen off and water should be given in just sufficient amount to keep the tubers alive. When they show signs of active growth in February repot and water lightly until sufficient roots are formed, when the water should be increased.

Propagation. So easily do the leaves of the Gloxinia produce tubers when properly manipulated, that it seems a roundabout way to get up a supply of plants from seeds. The only drawback to the first-named method is that leaves are not always available in sufficient quantities for propagating purposes. When plants are wanted in bloom before mid-Summer, the seed should be sown in early Spring. The process of raising seedlings is simple enough; a little neglect, however, when in the younger stages of their growth, is very apt to occur, and that is the end of them. The seedlings are very fragile for some time after germinating, and if the soil gets a trifle too wet, or too dry, they suffer beyond repair. In preparing boxes or pans for seed, let the soil be very porous and light, leafmold largely predominating. Make very firm; give a watering, then sow; and if a covering be given it should be of the lightest possible nature. If the atmosphere gets at all dry, cover the receptacles with panes



PRIMULA OBCONICA.—See page 149

of glass, to prevent drying. If care be taken the seedlings may be allowed to grow until large enough to be potted off singly in 2-inch pots, or they may be pricked off thickly into boxes previous to potting off. For flowering late in Summer or early in Fall, sowings may be made as late as the beginning of July.

In propagating from the leaves, various methods are employed. The one most commonly in use is to take the entire leaf, make incisions in the under parts of the principal veins (or they may be cut through); lay the leaves flat on the sand with the stalk buried, and give only enough water to prevent drying up. Small tubers will form at the incisions and at the end of the stalk. During this process no leaves are formed, and the tubers should be harvested and rested for the Winter in dry sand. This operation is best performed after mid-Summer. Another good method to get up stock of extra fine varieties from leaves is to cut them in sections resembling the letter V, the lower part to consist of at least an inch of the midrib, and the leaf cut obliquely to the margin. Treat them similarly to the triangular-shaped cuttings of the Rex Begonias, so far as potting them in the sand goes; but keep on the dry side while forming tubers. Smaller tubers are made by this method than if the leaves were laid flat on the sand; consequently it should only be used when it is desired to make the most of extra good kinds. Old tubers are successfully wintered over in the pots in which they have flowered; or, to save room, they may be taken from the pots, the soil removed, and stored in boxes of dry sand, keeping in a minimum temperature of 60 degrees. In starting, bring to the light and give water, potting up when about an inch of growth has been made.

GREVILLEA (Silk Oak). The *Grevillea robusta* is a first-class house plant, with leaves somewhat resembling the Ragweed. The plants are only of value in their younger stages of growth.

Culture. The plants will stand the full sun. A cool greenhouse suits them in Winter.

Propagation. Seeds are sown in March. Pot singly when quite small, and when in 3-inch pots plunge in a frame until large enough for 5-inch pots.

HAMELIA. A tender shrub very well suited for growing in tubs. When the plants are in good health they are covered with flowers during the greater part of Summer. *H. patens*, sometimes called Scarlet Bush, is the best species and well worth growing in the greenhouse.

Propagation. Ripe wood in early Spring.

HEDYCHIUM (Garland Flower). These have long been grown in conservatories, where plenty of room is at command. In small conservatories they are not desirable. *H. coronarium* has pure white, sweet-smelling flowers. *H. Gardnerianum* and its hybrid form are useful for planting near the margins of ponds, where their roots get an abundant water supply. They may be rested under a bench during Winter.

Culture. After blooming, dry-off the rhizomes and allow them to rest for a while. Pot in Spring or early Summer and use rich soil. Give plenty of water; the pots may be set half their depth in water.

Propagation. Divide the rhizomes every two or three years.

HIBISCUS (Rose Mallow). The varieties of *H. Rosa-sinensis* make first-class tub plants. The varieties known as *H. brilliantissimus* and *H. grandiflorus* are the best singles among the crimson varieties. There are double reds, yellows and pinks; among the latter is Peach Blossom. It has exceedingly attractive flowers; the name describes the color of the flower well. The plant blooms in a small state.

Culture. When grown in tubs they need liberal feeding, being robust growers; and as the flowers are produced on the young wood there has to be an abundant supply of this to have them looking at their best. With the help of liquid manure bushes will thrive in the same tubs for years. All of the kinds delight in a soil having a fair proportion of leafmold. A quantity of crushed bone may be added when the plants have to occupy the pots or tubs for any length of time. The varieties of *H. Rosa-sinensis* should be given a trial out of doors; they grow and flower very luxuriantly. They may be kept during Winter in a structure from which frost is excluded. In a low temperature, and kept dry at the roots, they are deciduous.

Propagation. Autumn-struck cuttings, if grown on during Winter, will give 6-inch pot plants by Spring.

HYDRANGEA. A highly ornamental shrub much forced for Easter and Memorial Day. They make handsome plants for decorative purposes. *H. opuloides* has been used most extensively, but the new French varieties are very popular and have stimulated interest in the forcing of Hydrangeas. Among the French varieties, General de Vibraye is a grand pink with good flower heads and forces well at all times. Mme. E. Mouillère is the most popular white.



HYDRANGEA HORTENSIS

Culture. The plants should be kept in a coldframe where, if properly protected from sudden changes, even a hard freezing in December will not harm them if they have been gradually hardened off. About Christmas they should be brought into the greenhouse and kept a week or ten days at about 45 degrees; then gradually moved to 50 and 55 degrees as they begin to grow. By the middle of January they should be showing some progress, and from that time forward they should have plenty of water and light. A temperature of 55 to 60 degrees should bring them along nicely for Easter. If backward in early March, a slightly higher temperature may be required, but should not be employed unless deemed absolutely necessary. Frequent syringing will be of great benefit. Field grown plants potted up in late October and weakly developed pot grown stock will not make satisfactory Easter plants, and should be saved for Memorial Day or later.

Propagation. *Hydrangea hortensis* and its varieties may be propagated either in Spring or Fall. When the work is done in Spring the cuttings must be taken from plants which are being forced in the greenhouse, the wood of which is in excellent trim for the production of strong, healthy roots. Those shoots which show no signs of blooming are the ones to be taken for propagation. The cuttings root very readily if given a syringing overhead two or three times daily. Pot in 3-inch pots and plant out from these about the middle of May. Or the plants may be potted into 5-inch pots and plunged in well-rotted stable manure. They are, however, easier looked after in the field, and there make plants every bit as good. Moreover, when lifted and potted they can be given fresh soil, which will suit them when taken in to force in the beginning of the year; whereas those in pots may not require shifting, so far as their size is concerned, and yet be benefited by fresh soil. Where Hydrangeas will stand the Winter some of each kind should be planted out permanently, so as to give an abundant supply of material for cuttings. These cuttings should be taken during the Autumn months, encouraged to fill their pots with roots, and then go to rest. When given a shift from 3-inch into 5-inch pots, and brought gradually into warmth, they develop very large heads of bloom, and toward the latter part of their development liquid manure is necessary.

INGA. For flowering in a cool greenhouse during March and April, but only in roomy structures, there are few things to surpass *I. pulcherrima* in the brilliancy of the flowers. These are arranged

in heads with an enormous number of stamens, which are the principal attraction.

Propagation. Take cuttings in February.

IXORA. This is hardly a genus for the florist to deal with, as the plants take more care than the prices obtained for them would permit. There are numerous species and varieties, all of which are attractive when well done. In the latitude of Washington, D. C., they make growth best when plunged outside, and some of them flower profusely out of doors. *I. Colei* is a good white; *I. Williamsii*, *I. coccinea* and *I. Chelsonii* are all very reliable species.

Culture. They will thrive in the warmest house during Winter. Peat, sand, and a little loam will make a suitable soil.

Propagation. Cuttings should be put in during March.

JACOBINIA (Libonia). This is a charming Winter-flowering, dwarf evergreen shrub. The species, *J. penrhosiensis*, is one of the commonest Jacobinias grown.

Culture. Its culture is of the easiest description, and almost any soil will suit the plant. They are suited to conditions for growing Begonias.

Propagation. Put cuttings in the warm propagating bed during the latter part of February; plant out middle of May to make growth; lift middle of September and flower in a moderately warm greenhouse.

JASMINUM (Jasmines). Although there are other meritorious species, *J. grandiflorum*, *primulinum* and *nudiflorum* are the ones usually grown.

Culture. Plant out the young stock in May, and by the end of September they should be lifted and potted. Keep in an intermediate house. The plants will stand full sunshine, and are of easy culture.

Propagation. They may be propagated either by layers or cuttings of nearly mature wood.

KENTIA (Howea). Two of the best kinds are *Kentia Belmoreana* and *K. Forsteriana*; they are useful either for house plants or decorating. When they reach a desirable size they should be kept on the cool side, as they will then be less liable to injury when used. (See also Palms.)

LÆLIA. *Lælia anceps*, the principal species, makes its growth from April onward. It is an abundant bloomer, but on account of

its resemblance to some of the Cattleyas, and having smaller flowers, it is not so popular. Flowers in November and December. A temperature of 50 degrees suits them.

LATANIA. The best known of all the fan Palms, *L. Commersonii* (*borbonica*) should be grown under the same conditions all the time, otherwise some of the leaf stems will be short and others long, making an unsymmetrical specimen. (See also Palms.)

LIPPIA (Aloysia). *L. citriodora*, the Lemon Verbena, grows very strongly when planted out, finishing up the season by covering itself with myriads of small, insignificant flowers. It is a very popular plant, on account of its sweet-smelling leaves, being almost identical in this respect with those of the lemon grass and *Eucalyptus citriodora*.

Culture. The plants may be grown in the field in Summer and brought into the greenhouse upon the approach of frost and there kept cool until February, when they may be repotted, pruned, and grown at a temperature of about 55 degrees.

Propagation. As the plants are not hardy, keep some old plants over Winter; start them early in Spring and root the growths as soon as they get long enough, in warm sand bed.

LIVISTONA (Chinese Fan Palm). The common species, *Livistona rotundifolia*, makes a very neat, little specimen plant. The foliage is of a bright green color. This Palm grows best in a warm house. *L. Jenkinsiana* is not much used as a decorative plant, but it is one of the most desirable for collections. (See also Palms.)

LOPEZIA (Mosquito Plant). *L. racemosa* makes an exceedingly weedy growth outside in Summer. This plant is desirable only for private collections.

Propagation. Cuttings put in the beginning of September, and the plants kept in a sunny greenhouse with a minimum temperature of 45 degrees, will give an amazing supply of bloom all Winter.

MAHERNIA (Honey Bell). *M. glabrata* is a dense-growing, dwarf evergreen shrub, with small, yellow flowers produced in Winter. The flowers have an odor much resembling that of the Violet. *M. verticillata* is also frequently found in conservatories.

Propagation. The cuttings should be made large, at least 6 inches in length. They should be taken before growth begins. The roots are sparingly produced. Put the rooted cuttings at the sides of the pots, so that they will take easily with the soil.

MALVAVISCUS. *M. mollis* and *M. arboreus* are greenhouse plants which in Winter take up too much room as specimens, and should not be grown for that purpose, as the flowers are not freely produced. For outdoor planting they are good subjects, making a large mass of foliage and bright red flowers. The *M. lanceolatus*, from Mexico, is the best for Winter flowering. The leaves are different in shape from those of the two first-named species, and it blooms more freely.

Culture. It stands a low temperature and is free from insects.

Propagation. Cuttings of all three root with the treatment given Coleus.

MARANTA. Most of the conservatory sorts known as Maranta are really Calathea. Of this genus *M. arundinacea* is commonly grown. When well grown they are among the most ornamental foliaged plants in cultivation.

Culture. (See Calathea, page 77.)

Propagation. By division of the crowns, when starting into growth in Spring.

MARGUERITE (See Paris Daisy, page 145.)

MEDINILLA. This magnificent flowering plant must have a high temperature, and should be in every collection of stove plants. The flowers are arranged in large, drooping racemes. *M. magnifica* is the species most commonly seen.

Culture. Give plenty of light but not too strong sunshine. Pot in sharp sand and fibrous loam with a little charcoal added. Water freely, but be sure to provide good drainage. A temperature of 68 degrees is necessary at night while in active growth.

Propagation. Cuttings root well when placed in a pot of loose moss, in a warm frame, or on a well-shaded bench of a warm house.

METROSIDEROS. These plants are grown for their showy red and white flowers and their long stamens. *M. robusta* and *M. tomentosa* are two of the better known species.

Culture. They thrive under conditions suited to Acacias.

Propagation. By cuttings struck in early Spring.

MIMOSA. It is always interesting to have a small bed of sensitive plants. One can be made cheaply, as there are enough available plants for the purpose, such as the common sensitive plants *M. pudica* and *M. sensitiva*. *Schrankia uncinata* is found plentifully



BOSTON YELLOW MARGUERITE, OR PARIS DAISY, IN A 7-IN. POT.
See page 145

in the Southern States. For five or ten cents we get packets of seeds of the Moving Plant *Desmodium gyrans*. When *Oxalis sensitiva* and *O. dendroides* are touched with the finger the leaflets fall down. *Mimosa pudica*, on the other hand, when touched, closes up. There are several other sorts, but the above number is enough to make this bed very popular, especially among school children.

Culture. The culture is of the easiest.

Propagation. All are easily raised from seeds offered by European seedsmen.

MONSTERA. There are several excellent house plants which are very little known, on account of the difficulty experienced in propagating them in sufficient quantities. Among the best of this class is the Monstera, a subject almost unique in the plant kingdom, owing to the broad leaves having perforations all over their surfaces. *M. deliciosa* is the species most commonly grown.

Culture. It needs little pot room, but plenty of water; in fact, the pot may be placed in a saucer of water. The question of soil is not important, but will do best in a bed of rich soil. It will continue to throw up leaf after leaf in a dwelling house just as well as if in a conservatory, the bright emerald green of the young leaves contrasting well with the deeper color of the older ones.

Propagation. The easiest method of propagation is to cut up the old stems to single eyes, and place in sand, in a warm house, where the cuttings sprout in a few weeks.

MUSA (Banana). There are a number of species grown in conservatories and others are useful for sub-tropical bedding. *M. Uranoscopos (coccinea)* may be grown in large pots and is very decorative because of its brilliant red bracts. It is dwarf and needs stove temperature. (For additional species see p. 287.)

MUSSÆNDA. A handsome warm greenhouse plant, cultivated for its colored bract-like growth. *M. frondosa* and *M. luteola* are two of the better known species.

Culture. They are of easy culture.

Propagation. In Spring by cuttings.

NEPENTHES (East India Pitcher Plants). In their native habitats they grow as vines. Under cultivation they are usually seen as dwarf, pot or basket plants. Many beautifully marked hybrids have been raised in recent years; these are, as a rule, easiest grown. *N. Mastersiana* is one of the best; *N. Dominii*, *N.*

Henryana, *N. Williamsii*, *N. Outramiana*, *N. Siebrechtii* and *N. Amesiana* are all well worth growing.

Culture. *Nepenthes* are very suitable for suspending from the roof of a greenhouse, as then the curiously-shaped appendages, or "pitchers," at the ends of the leaves are best seen. Moreover, some of the kinds have long leaves, and when the pitchers are half filled with liquid they hang lower than the base of the pot or basket. In this case the plants must be suspended from the roof. Their cultivation, with the exception of a few species, is not difficult. There are between 30 and 40 species, found principally in the East Indian Islands. The temperature should not fall below 65 degrees at any time of the year, and from this it may rise to 90 degrees with safety. At all times, these plants should be grown with as little ventilation as possible, as under those conditions growth will be more vigorous and a heavier crop of pitchers will be the result.

Pruning is a very important matter in their cultivation. With the possible exception of *N. bicalcarata*, none of the kinds should be allowed to grow over a foot high. When a few pitchers have been formed, or are forming on a shoot, cut the end out; this will very materially help in the development of those in process of formation, and will cause new shoots to burst out on which more pitchers will be borne. The material in which to grow *Nepenthes* should consist of fibrous peat and sphagnum in equal parts. Charcoal, crushed bone and sand in small quantities may be added. During the growing season the plants must never be allowed to get dry at the roots. One- and two-year-old specimens are the most satisfactory, although some of the kinds will keep in good condition as long as they have good material in which to make fresh roots. Shade during bright sunshine, and syringe frequently. The sexes are on different plants, and so far as I have observed all the species and varieties will intercross.

Propagation. Seeds are sown on a finely prepared surface of chopped moss, covered with glass. As soon as they can be handled the seedlings are pricked off in small pots. Cuttings should be taken from the half-ripened shoots about the beginning of December; they should be cut to single eyes only when a large number of plants are wanted. Terminal growths, short and stocky, make the finest plants, and in a much shorter time than single-eye cuttings. In a propagating frame, with a bottom heat of 80 degrees, plunge the cuttings in sphagnum; they may be either pushed through the hole of an inverted thumb pot or put in small pots, using a rooting me-

dium composed of sphagnum, sand and charcoal. I much prefer the first method.

NERIUM (Oleander). Much grown as a tub plant, for which it is well suited. Old plants should be kept as dormant as possible during the Winter.

Propagation. Cuttings are rooted early in the season, and plunged outside when established in pots.

NERTERA (Bead Plant). The only species of importance is *N. depressa*. If we desire to have something of real beauty in the cool greenhouse a few small tufts of this close-growing dwarf plant will satisfy most people. It never grows over 2 inches in height, but it is usually covered with myriads of orange-red berries.

Culture. When not in bloom or in fruit it will be best to place the plants under the bench of the greenhouse where, especially if the pots are plunged, they will keep in a healthy condition. It requires a sandy soil with a little leafmold.

Propagation. It may be propagated either by seed or division.

OCHNA. *O. multiflora* is an interesting and beautiful cool greenhouse shrub. The flowers are yellow. The calyx, at first green, changes to a brilliant red on the ripening of the fruit.

Culture. It requires a soil of fibrous loam with good drainage.

Propagation. Propagated by cuttings taken in the Fall.

ODONTOGLOSSUM. With the exception of *O. citrosmum* the species of this noble genus have a struggle for existence in the District of Columbia. Farther north they succeed better. *O. crispum* is one of the most popular, of which there are many beautiful varieties.

Culture. The Odontoglossums are cool house Orchids, 65 degrees, and the main difficulty of their culture results from injury due to high Summer temperature. They require abundant ventilation, good light, but some shade.

ODONTONEMA (Thyrsacanthus). *O. Schomburgkianum* is a shrubby plant attaining a height of 6 feet. There is nothing just quite like it with its graceful long sprays of red flowers all during the season. These plants are very seldom seen in gardens of amateurs because, like many other things, they cannot be sold to plant-lovers in public markets unless they are in flower.



PLANT OF CATTLEYA
SHOWING AIR ROOTS
AND PSEDOBULBS.

(See Page 89)

Figure 15

Culture. They are adapted to the warm house and are of easy culture.

Propagation. They are propagated easily by cuttings.

ONCIDIUM. *O. varicosum* and *O. v. Rogersii* bear large panicles of pale yellow flowers. Both are natives of Brazil, blooming during early Winter.

Culture. Same as *Odontoglossum*.

ORCHIDS. Although there is an immense number of species and forms of Orchids, few of them are grown solely for their cut flowers. The following genera of Orchids are discussed elsewhere in this book: *Calanthe*, *Cattleya*, *Cælogyne*, *Cypripedium*, *Dendrobium*, *Lælia*, *Odontoglossum*, *Oncidium*, *Phalænopsis* and *Vanda*. Most of them produce flowers but sparingly, and are chiefly grown in private collections. A large number being hybrids, very few of each kind are in cultivation; only those species and their varieties which are procurable in large quantities from their native haunts are grown for cutting from. Under favorable circumstances, and when their wants are understood, Orchids are as easily grown as any other class of plants. The epiphytal class has a growing and a resting period. During growth, as a rule, they need lots of water, and when resting they are kept on the dry side so as not to start shoots at the expense of the flowers. Shading is necessary as the sun gets powerful, and a stagnant atmosphere must be avoided at all times. Excellent general notes on Orchids are found in the Standard Cyclo-pedia of Horticulture, Vol. IV.

Potting Material. This is mainly to supply a reservoir for moisture during the growing period, and should consist of chopped Fern roots, at least six months old before using, live sphagnum, charcoal and broken pots. If grown in pots or pans these should be filled two-thirds with crocks, the plant elevated above the rim of the pot, using lumps of the Fern root, pieces of charcoal and finishing off with a thin layer of live sphagnum. The best time to pot is before the plants start growth.

PALMS. This order furnishes the most important of our decorative plants. Out of the large number of known species, comparatively few are in cultivation, and of these a very limited number is grown by the florist for this special line of work. Those kinds which are raised in quantity are selected partly because they are easily and quickly grown, seeds being obtainable in large quantities, and because the plants are exceedingly ornamental, and, as a rule,



COCOS WEDDELLIANA

COURTESY HENRY A. DREER, INC., PHILADELPHIA, PA.

stand rough usage, to a certain extent, without showing bad effects. Palms may be divided into two sections—those with pinnate or feathered leaves and those with palmate or fan-shaped leaves. *Latania*, *Livistona*, *Chamærops*, *Rhapis*, *Corypha*, *Licuala* and *Thrinax* are familiar examples of the section having fan-shaped leaves; while the feather-leaved section is represented by *Kentia*, *Phoenix*, *Areca*, *Arenga*, *Cocos*, and *Seaforthia*. The commercial kinds are grown very extensively by several firms, and so cheaply are they offered that it does not pay to raise the seedlings in small quantities. For collections rather lengthy lists of species are offered by several European seedsmen. The genera discussed elsewhere in this book are: *Acanthophoenix*, *Attalea*, *Chrysalidocarpus*, *Chamærops*, *Cocos*, *Kentia*, *Latania*, *Livistona* and *Phoenix*. Besides these, *Euterpe edulis*, *Rhapis flabelliformis* and

humilis, *Ceroxylon andicolum*, *Stevensonia grandiflora*, *Licuala grandis* and *Caryota urens* are also grown in collections.

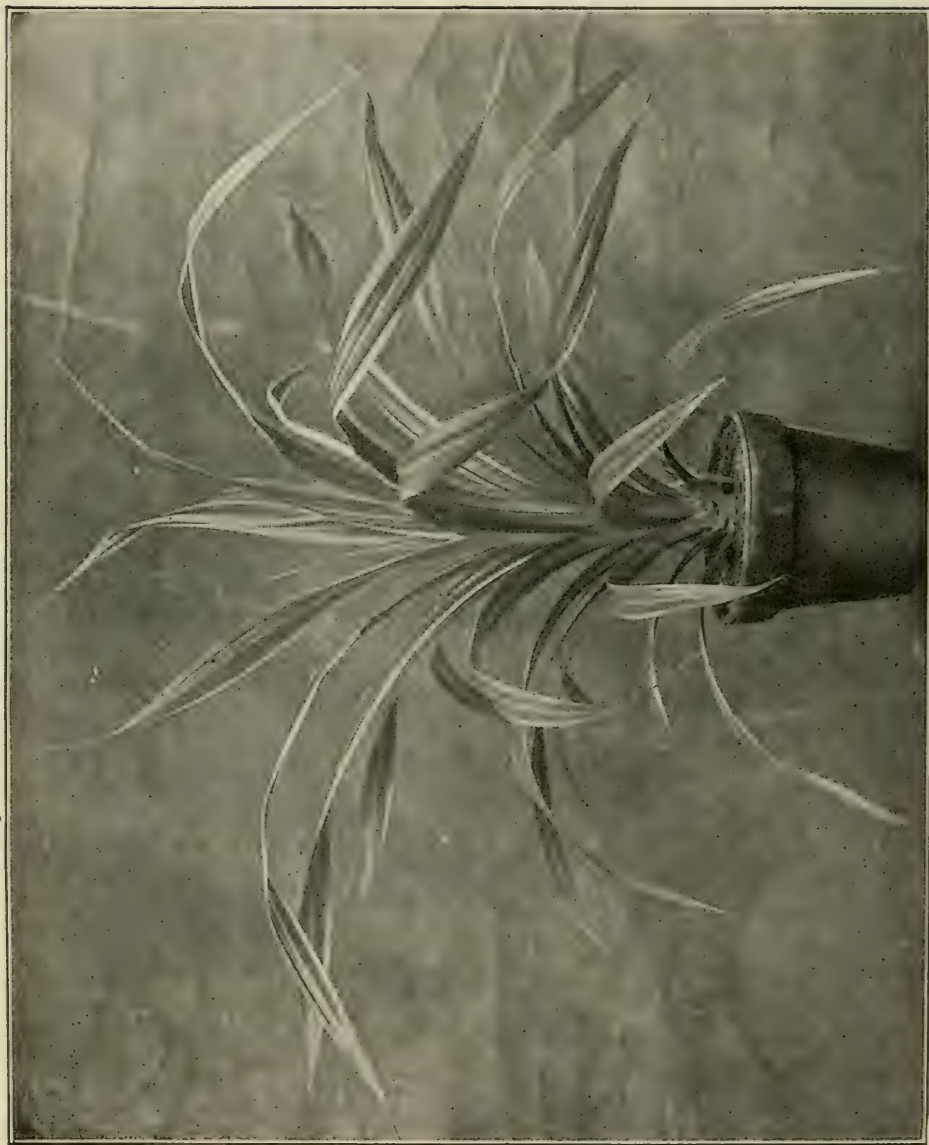
Culture. In this section of the country nearly all of the species make rapid growth out of doors during the Summer after they have reached a certain stage, say in 6-inch pots. They are plunged in half-decayed stable litter and partly shaded with lath slats. Large-sized plants will bear the full sun, but not when taken directly from the greenhouse. When it is desired that plants shall occupy the same pots for any length of time, very little, if any, vegetable humus should be among the soil. Crushed bone and a little charcoal will be found beneficial.

Propagation. The seeds should be covered to about twice their thickness in sandy soil and kept fairly moist and warm until they germinate. The drainage in the seed pan should be of such a nature that the roots can be easily removed from it, as very little is gained by potting in a very young stage.

PANDANUS. There are several variegated Screw Pines, but none approaching *P. Veitchii* as a commercial plant. No one will dispute its right to a place among the best twelve decorative plants; in fact, most people would put it in a shorter list. As a bedder it stands our warmest weather without the least shade. (See page 288.) As a dwelling house plant it has no superior, and as a stove plant, owing to its beautifully striped leaves, it tends to relieve the dull monotony of green. There are good and bad forms common in cultivation; those to be avoided have mono-colored leaves, and leaves with dirty white variegation. The good one has almost pure white markings. *P. utilis* is a green-leaved species, forming very handsome plants even in small pots. It stands well in a dwelling house, but, like *P. Veitchii*, must be kept on the dry side during the resting period. *P. utilis* is raised from seeds which, if fresh, germinate well. The soil for both kinds should be porous and enriched with a small quantity of bonemeal.

There are several other species, none of them grown largely, being principally found in collections. *P. tectorius (javanicus) variegatus* is quite as handsome as *P. Veitchii*, but needs more heat in Winter, and the hooked spines pointing two ways on each leaf is a feature very much against it. *P. Baptistii* is a handsome variegated plant, but too soft for use outside of a warm greenhouse. The true *P. graminifolius* is not of much use outside of collections.

Culture. These plants are perfectly at home under Palm-house conditions and thrive in much heat and plenty of water.



PANDANUS VEITCHII. (THE SCREW PINE.)—See page 143.

From January on, they start active growth and must be given suitable conditions by damping down the paths and benches several times a day. In potting use a compost consisting of four parts loam, one part leafmold, one part decayed manure and a little sand. In Autumn and early Winter, when they are in their inactive stage, decrease the amount of moisture, but give plenty of sunlight.

Propagation. In selecting stock plants take those which show lateral growths at or near the base of the plant. Large lateral growths do not make good specimens, but they should be rooted for subsequent use as stock plants. In rooting it will be found a good method to put each piece into a pot of sand and plunge in a propagating bed having a brisk bottom heat. The large, succulent and easily broken roots which the cuttings make, being confined within the pots, will be nicely preserved by shaking out the sand and replacing it with soil, or by being shifted into larger pots, as the cuttings will keep many weeks in the sand after roots are made without injury. Stock plants, which get too large and have an abundance of grassy side shoots, will be encouraged to develop those if the young leaves of the main growth be torn out. Young plants, plunged out of doors after the end of May, should be examined from time to time, as the roots are apt to get outside the pots; larger sized pots should then be given and the plants replunged.

PARIS DAISIES (*Chrysanthemum frutescens*). For Winter blooming the cuttings should be put in during late Spring. By the end of July they should get their last potting for the Summer, be pinched back and plunged so as to make large heads for Winter-flowering. These Daisies can be made to pay during the dull months from the number of flowers which can be cut from them. They are not so common as they might be, and Daisies in Winter are very desirable flowers with some people. Large plants are useful about Easter time. Left over plants in Spring can be planted out to furnish cuttings for Fall propagation, to give medium sized plants in flower for early Spring sales.

PAULLINIA. *P. thalictrifolia* is an elegant plant for clothing the tops of unsightly tubs in which Palms and other plants are growing, and is also useful for large vases. It stands the sun well. The foliage somewhat resembles the leaves of *Adiantums*.

Culture. Pinch the tops to make young plants branch out.

Propagation. Cuttings root best in September in the warm propagating bed.

PELARGONIUM (See page 288.)

PEPEROMIA. Useful little plants with peltate leaves, finely marked with bands of white between the principal veins. *Peperomia Sandersii* is grown either for filling shallow pans, mixed with other plants, or as specimen plants for the window. *P. maculosa* and *P. marmorata* are also well worth growing.



Fig. 16.—Leaf cuttings of *Peperomia*. A, Simple cutting of *Peperomia Sandersii*. B, A leaf properly cut prepared for making a leaf cutting. C, The growth from such a cutting as B. The young plantlet starts from a callus at the base of the leaf stem, or petiole.

Culture. Give plenty of water in Summer, but water carefully in Winter. They are best in a warm, shaded greenhouse.

Propagation. Propagation is effected at any time of the year by placing entire leaves edgewise or flat in sand.

PERESKIA. These are seldom grown for their value as decorative subjects. The flowers of several of the species are of a rather pleasing appearance, but they last only a short time and are not freely produced. Two of the species, *P. aculeata* and *P. grandifolia*, are common in cultivation, and are used chiefly as stocks for the gaudy flowered Epiphyllums.

Culture. (See Epiphyllum, page 113.)

Propagation. (See Epiphyllum.)

PHALÆNOPSIS. This genus of Orchids is characterized by having flat, strap-like leaves, leathery and thick, with large, attractive flowers. *P. amabilis*, a white sort, and *P. Schilleriana*, a pink species, are the principal ones cultivated. Keep the plants from drafts and give plenty of heat, 70-75 degrees, from March to October. They grow nicely on blocks of wood hung upon the rafters.

PHŒNIX (Date Palm). The commonest conservatory species are *P. rupicola*, *P. canariensis* and *P. Roebelenii*. The edible Date, *P. dactylifera*, is not so graceful for indoor cultivation. (See also Palms, page 142.)

PHORMIUM (New Zealand Flax). *P. tenax* and its forms are rather stiff-looking plants, especially in a young state; older plants furnished with an abundance of foliage are more attractive.

Culture. They require a rich soil and plenty of water.

Propagation. To increase, plant out in very sandy soil in May and divide in September.

PHYLLAGATHIS. *P. rotundifolia* belongs to the same family as the better known *Tococa platyphylla*. It somewhat resembles the former in general appearance. A few plants of it given a test outside during the Summer, in a position partly shaded from the sun, behaved splendidly, and in a position like the above, where the surface of the soil is covered with some low-growing plant, such as *Hydrocotyle* or *Lysimachia* to keep the sun from the roots, it may become a valuable feature for outdoor decoration. But for indoors, it may be used as a substitute for the more gaudy-leaved *Tococa*, as it succeeds in an atmosphere where the majority of greenhouse plants can be grown.

Culture. The following temperatures are required: December and January, 60 degrees; February and March, 65 degrees; March to end of Summer, high temperature. Increase the syringing with the temperature.

Propagation. Propagation for small plants is by the leaf, the petiole of which is inserted in sand, the blade lying flat on the surface and the ribs severed in several places. From the cut parts nearest the petiole, numerous small growths are made; these, when an inch or so high, may be potted. For making specimen plants quickly old subjects which have been encouraged to branch may be cut up, and the pieces inserted in pots in bottom heat. They send out roots very quickly.

PHYLLANTHUS (Snow Bush). *P. nivosus* is a shrub hardly suitable as florists' plants, but for public or private establishments they should always be grown, as their foliage, in a young state especially, is most beautifully colored even when grown in the open air during Summer. In this latitude we plant them out along with other bedding material; they are exceedingly effective.

Culture. The old plants are cut back severely in Autumn, potted and stored in a rather warm house.

Propagation. In February cuttings of the medium thick wood are taken, and rooted in strong heat.

PLUMBAGO. Two sorts commonly treated as greenhouse plants are *P. capensis*, a light blue, and *P. rosea* var. *coccinea*, a scarlet. They bloom after mid-Summer on the current year's growth. Our warm Summers are very favorable to its growth out of doors, and it certainly ought to be largely grown for this purpose, as there is no other plant than *P. capensis* which can supply the color (light blue) so abundantly. There is a white-flowered form which goes well with the blue one, but this should not be confounded with *P. zeylanica*—a worthless species.

Propagation. Plants from Fall struck cuttings will be large enough by planting out time to fill 4-inch pots, and they ought to be planted out from this size for early blooming, as younger plants are too apt to make growth instead of flower. The best flowering plants are those which have been wintered over in a dormant state, the larger the better; by mid-Summer they are a solid mass of bloom.

PLUMERIA. This class of plants is somewhat neglected. We see them only in places where a general collection of stove and greenhouse plants are grown, and yet their flowers are large, showy and sweet smelling. The stems and foliage have an ornamental character of their own. The species grown is *P. acutifolia*.

Culture. They make very rapid growth in Summer, being well suited for tub culture. The plants should be kept dry during Winter. The leaves will fall off early, and the pots or tubs in which the plants grow may be laid on their sides under the bench of a greenhouse.

Propagation. In propagating, which may be done best during February, the cuttings may be taken from 6 inches to a foot long; stand them upright or leaning against the back part of the propagating bench, but not with the bases buried in the sand. Nor should they be allowed any water for a week or two. After the cut part is

well healed over they may be potted in almost dry sand, in which they root quickly if put in a brisk heat.

PRIMULA (Primrose). In this place only the sorts used in greenhouses are discussed. (For outdoor sorts see page 211.)

Primula sinensis has not by any means been left behind in the improvement of florists' flowers. The latest strains put on the market would almost be taken for new species by those who only knew the plants of years ago. *P. sinensis*, although losing favor in some sections, is a popular Winter-blooming plant.

Propagation: The seed may be sown as early as the last of March to have plants in 5- and 6-inch pots in bloom before Christmas. Later sowings should also be made, but it should be borne in mind that the plants make their best growth during cool weather. They may be summered in a well-aired and shaded frame.

Primula obconica has been evolved from the rather inconspicuous flower of the type to one worthy of standing alongside those of the finest strains of *Primula sinensis*. *P. o. grandiflora fimbriata* are heavily fringed, and range from pure white to deep rose. The largest individual flowers are a little short of being an inch and a half in diameter. The plants are exceedingly floriferous; some in 6-inch pots have the foliage almost hidden by bloom. (See p. 128.)

Propagation: To have plants in flower by the first of the year the seeds should be sown as early in the season as possible. Cover the seed very lightly with finely screened sphagnum, moistening the surface whenever it shows signs of becoming dry. As soon as large enough to handle the seedlings may be either potted off singly, or placed around the edge of a 3- or 4-inch pot previous to giving them their first pots. During the Summer the seedlings should be shaded from the sun and never allowed to get dry. They do not make much headway during the very hot months. The plants will not suffer if given their last shift just as they are coming into bloom. Keep in the coolest house

P. Forbesii is an interesting species because of the enormous number of flowers produced on even small plants. Several plants may be potted together in shallow pans.

P. malacoides, the Fairy Primrose, was introduced in 1908 from China. It is perennial, but by the florist is treated as an annual. It somewhat resembles *P. Forbesii*, but is larger flowered and more branchy in growth. The flowers are lilac and rose. (See p. 123.)

Propagation: It is a most dainty species, blooming in Winter if the seeds are sown in the Spring; or if the seeds are sown in July

and the first flowers kept picked the plants may be made to bloom nicely in the Spring; still later sowings in September will give plants for Easter and after. It requires an abundance of water and cool conditions, 55 degrees, and in this respect differs from *P. sinensis*. *P. malacoides* is excellent for cut flowers, for table decorations, bridal bouquets and corsages, as well as a good pot plant.

P. floribunda with small yellow flowers has a very floriferous form named *P. f. Isabellina*; the flowers are creamy white. This species is more compact and smaller than *P. kewensis*.

P. kewensis, possibly a hybrid between *P. floribunda* and *P. verticillata*, bears yellow flowers and well grown plants serve a need for some yellow plant for Winter. The stems are covered with a white mealiness. Given the same culture as *P. obconica*, the plants succeed nicely.

Lemoine has introduced a variety, La Lorraine, which is a cross between *P. Veitchii* and *P. cortusoides*. It is of vigorous habit with rich foliage. The leaves are of medium size, with indentated edge and very hairy on the reverse. The numerous flower stalks, which reach a height of 8 inches, are stiff and hairy, and bear trusses of 20 to 25 blooms each, $1\frac{3}{4}$ inches across, of a fine crimson pink with large, bright yellow eye, and of sweet perfume. Lemoine expressed the hope that this would be the forerunner of a new race.

Primula hybrida Ville de Nancy is a product of the same cross; its leaves resemble those of La Lorraine, though somewhat less hairy on the reverse. The truss is of elegant shape, and the florets of new form, deeply indented and toothed. The color is a bright crimson purple, with yellow eye. It has a slight perfume. Both of these *Primulas* bid fair to become popular commercial plants.

Pollinating *Primula* Flowers. Any extra good forms of *Primula sinensis* or *P. obconica*, desirable on account of large flowers, shape, or color, should be set aside for seed. During the Winter months, when insects are scarce, pollinating will have to be done by hand, as it is rarely the case that a flower of *Primula* is fertilized by its own pollen. For seed plants preference should be given to those having the pistil protruding from the corolla tube. It may be stated that Primroses have two kinds of flowers, each kind on separate plants, one having what is called the style elongated until the stigma shows plainly from the mouth of the tube formed by the bases of the petals, while the stamens are attached near the bottom of this tube. In the other flower the positions of the organs are reversed, the style being shortened so that the stigma is more than half way down the tube, and the stamens are in full view near the

mouth of the tube exactly in the position occupied by the stigma of the long-styled flower. The pollen of the Primrose is ripe before the petals are expanded, but at this stage the stigma of the same flower is not in a condition to receive it. Those flowers having elongated styles are easiest to manipulate, and if I am not mistaken, they are the best seed bearers. Pollen, from either short or long-styled flowers, may be applied to the stigmas. When it is necessary to pollinate those with short styles, it is, of course, impossible to get at the stigmas with a small brush, owing to the anthers filling the mouth of the corolla tube, but with a pair of small scissors the corolla tube may be snapped in two immediately below that part to which the stamens are attached, thus giving easy ingress to the stigma. Keep the atmosphere as dry as possible while fertilization is taking place.

REINWARDTIA (Linum). *R. trigyna* and *R. tetragyna* are both desirable Winter-flowering plants. *R. trigyna* is the best known; the other one has light yellow flowers and is the most floriferous.

Culture. They may be planted outside, middle of May, and lifted during the end of September, if large specimens are required for the greenhouse; or from cuttings rooted in April they may be grown on in pots, pinching occasionally.

Propagation. They are increased by cuttings from the strong growths which start from the base when the plant is cut down. *R. trigyna* is the only one which seeds freely.

RHIPSALIS. There are over a dozen species of this curious genus in cultivation. They are interesting because of their long hanging growths and berries resembling those of the Mistletoe.

Culture. They are best grown along with Cactus plants and will thrive under similar treatment.

Propagation. They are very easily propagated by the use of cuttings.

ROSES (See page 341.)

RUELLIA. For a greenhouse plant for amateurs *R. macrantha* is one of the best. The flowers are very large, tubular-shaped and magenta in color.

Propagation. Cuttings rooted in September will furnish fair-sized flowering plants by the end of January. These may be planted out end of May, in the open ground; by the end of September they will have made considerable growth; and if large specimens are wanted they may be lifted and potted.

RUSSELIA. *Russelia juncea* is an old plant but too seldom seen; it is probably the most useful of all our basket or vase plants. It sends out long arching branches of rush-like growths with flowers of an intense scarlet. Planted singly in vases there are few things to equal it in appearance. *R. Lemoinei* and *R. elegantissima* are both good. The flowers are smaller than those of *R. juncea*, but more of them are produced. The two latter are better Winter flowering plants than *R. juncea*.

Culture. They are of easy cultivation.

Propagation. To propagate, take a handful of shoots at a time and cut them into lengths of from 4 to 6 inches. In this way 200 cuttings may be made with two strokes of the knife, and every one will root.

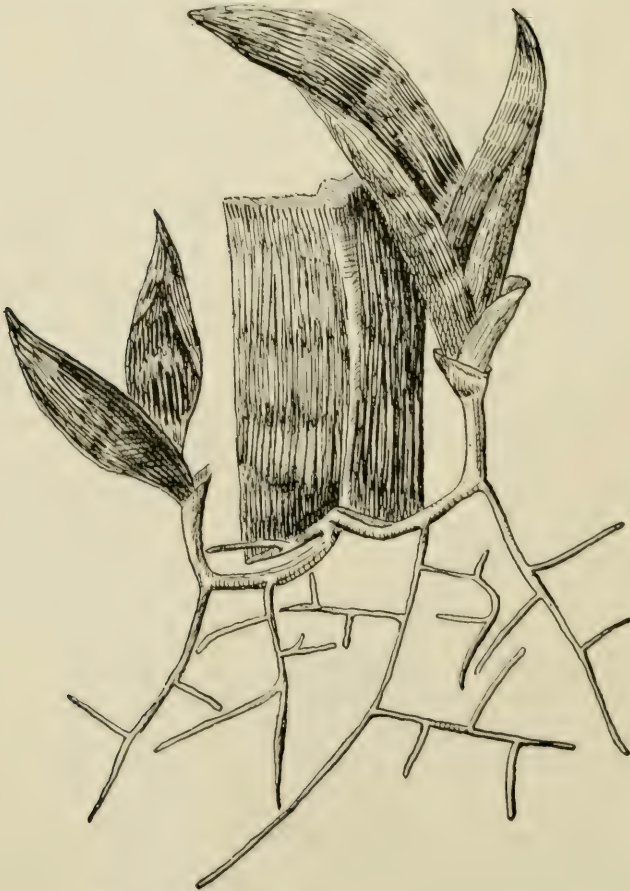


Fig. 17.—LEAF CUTTING OF SANSEVIERIA

SAINTPAULIA. *S. ionantha* is a very pretty dwarf, blue-flowered plant, the leaves resembling those of a Gloxinia but smaller. With little trouble it may be had in bloom at almost any season.

Culture. The plants may be flowered all the year round, or given a period of rest by partly withholding water. Their culture is similar to that of Gloxinia.

Propagation. The end of March is a good time to propagate. Cut off the ripened leaves with about an inch of stalk attached and insert in the sand bed, covering only a small part of the leaf blade. The sand should not be kept too wet.

SANSEVIERIA (Bowstring Hemp). These plants are grown mostly for their stiff, erect leaves, but their flowers are beautiful. *S. zeylanica* is one of the few species grown, its variety, *Laurenti*, has leaves with white margins.

Culture. They like a cool house, and can be used in house decorations since they do not require much sunlight. They thrive best in a heavy soil.

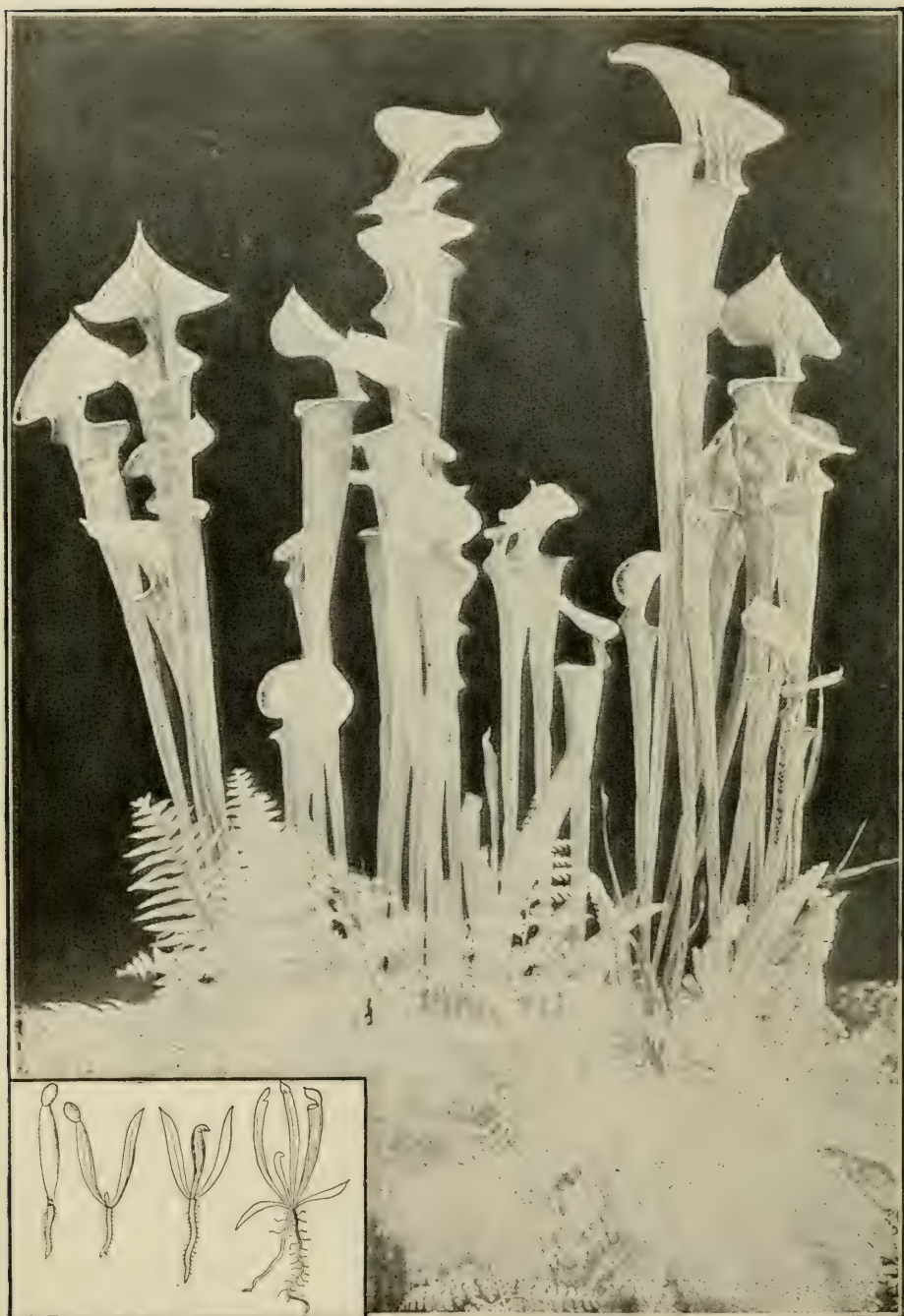
Propagation. They may be increased by division or leaf cuttings about 3 inches long. *S. z. Laurenti* does not propagate its variegation by leaf cuttings.

SARRACENIA (Pitcher Plant). Natives of the Eastern States. There are seven species and a large number of hybrids; much prized in Europe owing to their curiously-shaped, and in some cases highly-colored leaves. *S. Drummondii*, a native of Florida, is the finest of all the kinds, none of the hybrids approaching it in the gorgeous markings of the foliage.

Culture. Sarracenias are best grown in a cool, sunny house. The potting material should be the same as recommended for Nepenthes. (See page 137.)

Propagation. Sow seeds in chopped sphagnum moss.

SKIMMIA. *S. japonica* and *S. Fortunei* are handsome plants when in fruit. We import them from Japan, but they are usually unsatisfactory when they arrive in America, owing to many of the berries having dropped. It should be an easy matter to have this plant grown in some of the Southern States as there is nothing particularly difficult in its propagation and cultivation. It is one of our prettiest berried plants. Those grown in the northern part of Japan are the hardiest. They sometimes survive the Winters at Washington, D. C. The sexes are on separate plants, therefore both sexes should be grown together to produce fruit. Without the bright colored fruit they are not very ornamental.



SARRACENIA. SMALL PICTURE ON LEFT SHOWS GERMINATION

Culture. They are of rather slow growth and a sandy, loamy soil suits them best. A partly shaded position is preferable.

Propagation. By seeds sown in Fall and stratified and by cuttings.

SMILAX. (See Asparagus, page 63.)

SOLANUM. The Jerusalem Cherry or *Solanum capsicastrum* and the ornamental Peppers (*S. pseudo-capsicum*) are worth while Christmas plants, especially admired because of their dwarf habit and abundance of bright scarlet fruits. The variety Cleveland is most grown at present as it has larger and more fruit than the type.

Culture. Many growers set them in the field during the Summer, but they are severely checked by taking them up and crowding into a practical sized pot. It seems best, therefore, to Summer them in frames. Wet conditions cause the foliage to become yellow and drop.

Propagation. Seed is sown from January to March in flats. It germinates readily. The seedlings are potted in small pots and shifted gradually so that by June they are in 5-inch pots.

STEPHANOPHYSUM (Ruellia). For conservatory decoration *S. longiflorum* is a most useful plant during the dull months, small-sized subjects being covered with bright red flowers. It is not only useful as a Winter-blooming plant but it comes in well for planting out in Spring, blooming satisfactorily during the Summer.

Culture. They are of easy culture.

Propagation. The ease with which flowering plants may be had by the end of the year is remarkable. Cuttings are put in the usual time that soft-wooded bedding plants are propagated; they root in a few days, after which they are put in 3-inch pots. Three of the plants may then be put in a 6-inch pot, and by keeping them in a growing temperature they may be had in full flower two months after the cuttings are taken.

STEVIA. A fine white, fragrant flower, widely cultivated, useful for combining in bouquets, is *Piqueria trinervia*, called by florists *Stevia serrata*. To prevent the plants getting wiry constant pinching should be resorted to. Pot-grown plants are preferable to field-grown subjects for late flowering, as the plants in pots can be stored in a place from which the frost is just kept out, so as to fill space vacated by Chrysanthemums. Field grown plants may get their last pinching during September, and in the benches should be planted quite close together.

Propagation. Cuttings are struck in late Spring. Put in 2½-inch pots; from these they are shifted into 4-inch pots. At the beginning of August they are transferred to 6-inch pots.

STRELITZIA (Bird of Paradise Flower). Grown for its Banana-like foliage and the very odd, showy flowers. *S. Reginae* is the commonest species; the flowers are orange and purple.

Culture. It prefers considerable sunlight, a copious supply of water and a strong soil. A temperature of 50 degrees at night is ample.

Propagation. It may be propagated from seed which are produced by hand pollination. The usual method, however, is by suckers and division.

STREPTOCARPUS (Cape Primrose). These plants have now attained such a high degree of perfection that they should be included in every general collection of greenhouses decorative plants. They are better window flowering plants than is generally supposed, not requiring a very high temperature at any time. There are a number of good species of this genus.

Culture. They prefer an open sunny place in an intermediate temperature.

Propagation. Seed, to produce flowering plants in the Fall should be sown during March. As the seed is very small, extra care should be taken in the sowing and subsequent treatment until the plants are large enough. In connection with the germination there is a peculiarity not noticeable in other plants. Two tiny seed leaves are produced shortly after sowing the seed, and after a while one of these seed leaves dies, the other continuing to elongate. In some of the species, notably one named *S. Wendlandii*, this seed leaf, which at first is about the size of a pin head, expands till it gets about 18 inches long and a foot broad.

STREPTOSOLEN (Browallia). *S. Jamesoni* is a useful plant with orange flowers for late Winter flowering. It is naturally a low-growing, softwooded evergreen shrub, with a rather straggling appearance. When grown as a standard it is an extremely ornamental subject.

Culture. In Summer the plants may be plunged in a bed of ashes and frequently fed with liquid manure. They need full sun.

Propagation. When standards are desired, take strong shoots for cuttings, and grow to single stems, removing the side shoots

and stopping the main shoot when the desired height has been attained.

STROBILANTHES. *S. anisophyllus* and *S. isophyllus* are very neat and useful Winter blooming plants for the warm greenhouse. Flowers are light purple.

Culture. They require a high temperature, an abundance of moisture and much syringing.

Propagation. Cuttings should be taken in early Spring. Plant out for the Summer, lifting and potting end of September.

SWAINSONA. Not only is this plant useful for Winter blooming, but early struck cuttings grown in well-drained soil will flower well in Summer and the flowers are always useful for the florist for use in designs. Old cut back plants which have flowered during the previous Winter will also supply an abundance of bloom when planted out.

Propagation. Cuttings root readily.

SWEET PEAS. There are numerous methods of growing this popular flower for Winter and Spring bloom; perhaps the greatest success is secured in ground beds. The preparation of the soil is the all-important item. The plant is a gross feeder, and, necessarily, the soil must be rich and deep. Soil troubles are responsible for most of the failures to grow first-class flowers. Three parts good loam and one part well-decayed cow manure with a little lime to a depth of 15 inches has proved the best medium for good growth and production. It is always advisable to be certain of having a little soil from clover or other legume pastures incorporated with the soil in the beds.

Sweet Peas may be grown nicely following a crop of Tomatoes. There are various methods used in raising the young plants. The seed is sometimes sown in pots and transferred to the beds. The best plan naturally is the one which occasions least disturbance to the roots. Troubles commonly arise because of unfavorable house conditions, such as high, moist temperatures, inducing weak growth. It should be borne in mind that the Sweet Pea is not a greenhouse flower; it thrives best in the open in cool climates. In Washington they are past their best by the month of May. In Maine they are in good condition for at least three months later. In Montreal and in Scotland they last till the end of Summer. During warm, sunny weather an abundance of ventilation must be given; a warm and humid condition should be avoided at all times. The Sweet Pea is



SWEET PEAS

gradually filling more greenhouse space year by year and its cultivation is by no means difficult if a few don'ts are kept in mind.

The demand for Sweet Peas is greatest in the Winter months; therefore, the house chosen for the purpose should be so constructed as to catch the maximum amount of sunshine. It is not possible for every establishment to have a house with a long span to the south on the side of a hill; a structure of this character is peculiarly well fitted for the best development of this plant, but satisfactory flowers can be produced in other less favored structures. In the formation of the beds perhaps the best method is to have them raised above the alleys to a height of 8 or 10 inches. The beds may be from 4 to 6 feet wide, running east and west, and the rows arranged crosswise in the beds. This plan gives the best opportunity for the sun to play on every part of the plant for a portion of the day. Water should be applied between the rows partly to encourage the roots to grow in a horizontal direction. When gathering the flowers, boards should be used on which to stand, thus preventing puddling of the soil. The most suitable varieties must be left to the judgment of the grower. The period between sowing the seed and the flowering stage is from two and one-half to three months. In sowing the seed rapid germination is secured by placing the seed in water until it begins to swell; sow in drills and cover with sand. Four to 6 inches apart is a safe distance. The tall varieties should be sown at the north side of the house, the dwarfer varieties toward the south. In no case should the rows be less than 4 feet apart. A sharp lookout should be maintained to prevent red spider from gaining a foothold. The Sweet Pea is prone to the attacks of this pest, especially when high temperatures are maintained and the soil becomes dry. Syringing during the early part of the day when the soil is on the dry side is the only safe remedy when this pest has secured a standing. Green fly is kept in check by fumigating. Supports for the vines must be provided before the plants have got beyond the seedling stage. The flowers should be cut as soon as they are in a marketable stage and the seed pods removed as soon as they appear. (For outdoor culture, see page 238.)

TETTRANEMA. *T. mexicanum* is the only species cultivated and is commonly known as the Mexican Foxglove. It is not very often that we see such beautiful plants running wild all over the out-of-the-way places in greenhouses as we do in this species. It produces seeds in abundance, and it can be grown on the north side of a building in Summer until frost. It is much used with other things in hanging baskets and in window boxes.

Culture. A warm house suits it best, but it may be used as a window plant. With proper care it may be made to flower most of the year.

Propagation. By seeds.

TINNEA. *T. æthiopica* is a shrubby greenhouse plant sometimes called the Tree Violet, owing to its flowers having the same fragrance as the Violet.

Culture. It is adapted to the warm house.

Propagation. It is propagated from good-sized cuttings of the dormant wood.

TOCOCA (Sphærogyne). *T. platyphylla* bears the distinction of being one of the finest foliage plants in cultivation. Together with *Cyanophyllum magnificum*, another noble-leaved plant, it belongs to the same order as our common Meadow Beauty (*Rhexia*).

Culture. They require a shady and fairly moist place in a warm house. In potting, use leafmold and fibrous loam, and give good drainage.

Propagation. Both of these plants look as if they would be very difficult to propagate, but, on the contrary, they are exceedingly easy subjects, so easy that if the conditions are all right, there is no excuse for losing a cutting. Mossing the tops is a rather slow and unsatisfactory method, and, I think, single-eye cuttings can be just as rapidly grown into specimens as successfully rooted tops. During January the plants are in less active growth than at any other period, consequently this is the best season for putting in the cuttings. Split the stems, making single-eye cuttings; shorten back the leaves to within about 2 inches of the leaf stalk, leave about $2\frac{1}{2}$ inches of stem (less than this will root poorly); put firmly in sand of warm propagating bed, taking care that the under part of the piece of leaf lies flat on the sand; cover with glass. Rooting will be indicated by the buds elongating. Pot in thumb pots and keep close for a time.

TRICHOSPORUM (Æschynanthus). Along with a dozen other beautiful species, *T. grandiflorum* can be grown successfully with the warm-house Orchids. All the species are worth growing and as they flower much more freely than the Orchids, they help to brighten up the sometimes flowerless plants with which they associate.

Culture. They should not be allowed to flower the first year, thereby increasing the future flowering ability of the plant. Pinch

the shoots three or four times during the season. The plants should be hung from the roof of the house near the glass.

Propagation. Young plants are easily raised from cuttings of ripened shoots; they are also propagated by division. They delight in the same rooting medium as the Orchids. They can even be tied to pieces of wood with the roots covered with moss.

VANDA. The commonest species cultivated is *V. cærulea*. The Vandas make their growth along one central axis, the growth is described as monopodial and differing from many other genera of Orchids in which the new growth takes place from the base of the shoots. They like plenty of light and require no shade from November to the latter part of February. The day Winter temperature should be about 70 degrees; when the temperature gets much higher ventilation should be afforded. The Vandas prefer a humid atmosphere.

VIOLA (Violet). *V. odorata* is the parent of the numerous single and double forms which are grown for their flowers in Winter and Spring.

Culture. In this section the plants are given their Winter quarters in June. They are largely grown in frames from which frost is excluded by banking the outside with stable litter level with the sash, and running at least one 1½-inch heating pipe in the front or back part of the frame. But even under those conditions the flower crop is not continuous during very severe weather. In planting in benches or beds, the operation is usually completed by June 15. Benches are used with about 5 inches of soil. Narrow and low-roofed, equal-span houses, running east and west, with the benches as near the glass as possible, produce satisfactory results. Houses of the same order running north and south do not produce as many nor as good blooms during mid-Winter. The temperature is safe for the plants as long as frost is excluded, but 10 degrees above the freezing point should be the minimum for continuous flowering. In Winter the temperature may rise to from 55 to 60 degrees. Many growers advise much lower temperature. Airing must be carefully attended to so as to maintain a cool, dry atmosphere. A hot, moist, stagnant atmosphere supplies perfect conditions for weak, sickly growth, and is certain to encourage the development of fungoid diseases. The soil should be loamy, mixed with at least a sixth of rotted cow manure and a very small quantity of pure bonemeal. After planting the glass is shaded with turpentine or naphtha and white lead, allowing full ventilation. Water

only when moderately dry. In August, or beginning of September, the plants should get a shallow mulch of leaf soil mixed with dried horse manure. All leaves which show the least signs of decay should be removed and burned.

During Summer, syringing should be attended to frequently, for the purpose of ridding the plants of red spider, their greatest enemy. For this purpose the water must be applied with considerable force to the lower surfaces of the leaves. The plants can, however, be kept tolerably free of this pest if proper growing conditions are supplied, as red spider is only found on plants which are enfeebled through some cause. When syringing is to be done it should be attended to in the early part of the day, and in bright weather, so that ventilation may be relied upon to dry the foliage before night—a most essential item. For ridding the plants of aphides, the use of hydrocyanic acid gas is much preferable to tobacco in any of its forms, as it leaves no objectionable odor.

When leaf spot, the most dreaded of the fungoid diseases, appears, the leaves should immediately be picked off and burned, for by being allowed to continue on the plant the fungus will ripen its spores and spread to other leaves. It is present more or less in all houses, and is only kept under control by supplying favorable conditions for the growth of the plants. When grown outdoors or in frames without protection the leaves are apt to suffer from too much moisture in the shape of dew. This condition is very favorable for the increase of spot.

There are several other more or less hurtful fungoid diseases which can only be guarded against by giving the plants proper treatment, and their ravages curtailed by picking off and burning the infected parts. Very weak liquid cow manure may be given occasionally if the plants are in need of a stimulant.

Propagation. The stock is increased by cuttings and division of the old plants. From the nature of the species the method of building up a plant from the cutting, or runner, is the surest way of obtaining free-growing, healthy specimens. The plants send out runners, and those intended for propagation should be allowed to develop to a certain extent. In the latter half of February, and during March, they are taken off and either inserted in the sand bed of a cool house or dibbled in boxes of sand and kept under conditions favorable to rooting. Cool conditions are more essential for Violets than for most other plants. When rooted they are put in 2-inch pots. After the roots show on the outside of the ball they are given

a shift into 3-inch pots and placed in coldframes, giving abundant ventilation and shaded either with naphtha and white lead, or with lath slats.

XANTHOSOMA (Phyllotænium). This plant, which belongs to the Caladium family, should be employed for decorative purposes more than is the case at present; not only because the foliage differs from the small number of kinds of plants used for decorative work, but mainly for the reason that it will stand the rough treatment given to those plants more so than one would expect. It is a stove plant and one of the most ornamental. After a goodly number of leaves have been developed in a warm, moist atmosphere the plants will continue to keep up a presentable appearance with ordinary greenhouse temperature, and they may even be used as house plants. The leaves are shaped somewhat like those of the fancy-leaved Caladiums; the texture is much firmer, the color is green with white markings along the principal veins. Two of the species most commonly grown are *X. sagittifolium* and *X. Lindenii*.

Propagation. By division. Before repotting put the pieces in a warm sand bed to encourage fresh roots.





ACHILLEA PTARMICA VAR. FLORE PLENO

CHAPTER VII

Hardy Perennial Plants

ABRONIA. *A. umbellata* is a plant very common by the seashore in Southern California, where it is known as the Beach Heliotrope. It is also called the Sand Verbena. If it were to be planted near to the seashore in the East it might be a welcome addition to the list of flowering plants and would, no doubt, grow nicely from Atlantic City south along the seashore.

Propagation. It is increased by cuttings and from seeds.

ACÆNA (New Zealand Bur). A native of New Zealand. In localities where this plant will thrive, it will be found one of the best trailing dwarf sub-shrubs. The flowers are inconspicuous, but the flower heads, on maturing, are covered with long, crimson spines, which give the plant a very ornamental appearance. For a rockery few plants surpass the *A. microphylla* in forming neat, compact masses. None of the other species are so attractive as this in the flowering stage. It is not particular as to soil. In this locality young plants are best put out in their permanent positions early in the Fall, as when put out in Spring they do not make sufficient growth to insure a healthy, vigorous condition during the hot months.

Propagation. By division and from seeds.

ACANTHUS (Bear's Breech). In warm spots, at least two of the species are hardy with us, but they bloom only sparingly. In one or two of the species, but notably in *A. spinosus*, the flower stalks have a handsome appearance for quite a while after the flowers are dead. *A. mollis* and *A. m. latifolius* were used for bedding. They are deep-rooting plants. In the colder parts of the country all of the species should have the crowns protected in Winter. Excessive moisture is fatal.

Propagation. These kinds are easily increased by division of the roots. Seeds are readily obtained. The seedlings may be planted out in places where they are to remain a few weeks after germinating.

ACHILLEA. A hardy composite, with large, flat corymbs of white, yellow, red or purple flowers. The leaves are often much divided. They usually grow from 1 to 2 feet high. *A. ptarmica flore pleno*, the variety known as The Pearl, is one of the most desirable of hardy herbaceous plants, because of the flowers, which are double and white. They are produced in great profusion if the plants get fair treatment. This Achillea should not be divided in Spring, for unless favorable weather conditions follow the operation the plants will receive a check from which they do not thoroughly recover the same season. If taken up and divided during the first half of October, replanted and watered if necessary, they will develop working roots before freezing weather, and send up flowers the following season as if nothing had happened. Do not divide the plants too closely, and if the ground in which they are growing is dry, water well before the operation and give another watering when the pieces are replanted. Other varieties of *A. p. flore pleno* are known as Snowball and Elegans; all of them are white flowered. *A. tomentosa* is a dwarf, woolly-leaved evergreen, with yellow flowers. Increased by division. *A. mongolica* grows about 18 inches high, bears single white flowers. Comes into bloom early, and is used for cutting. All of the kinds need full sunshine.

Culture. It is one of the easiest plants to cultivate in the open border, spreading very rapidly and flowering profusely.

Propagation. Large clumps may be divided with a spade at any time during Spring or Autumn and replanted.

ACIPHYLLA. New Zealand umbelliferous plants, with dense rosettes of sharp-pointed leaves. In a young and flowerless stage they are attractive, and may be used in Summer for rockwork. *A. squarrosa*, sometimes called the Bayonet Plant, is very ornamental. *A. Colensoi* forms a circular bush 5 or 6 feet in diameter, having flowering stems 6 to 9 feet high. In the colder parts the plants should either be lifted and stored in a frame, or protected by a covering of some kind.

Propagation. Both are raised from seeds sown during the latter part of February.

ACONITUM (Monkshood). The species are very numerous and have a wide geographical range. *A. Napellus* is the best known; unfortunately, it is one of the most poisonous of cultivated plants, but hurtful only when taken internally. Some of its varieties are *A. N. album*, flowers white; *A. N. longibracteatum*, rich blue; *A. N. bicolor*, white and lilac; *A. N. Braunii*, deep purple. *A. ochroleucum*



ACONITUM

and *A. pyrenaicum* have pale yellow flowers. *A. Napellus* and its forms flower about mid-Summer. *A. Fischeri*, a pale blue flowered native species, blooms late in Summer. In the warmer parts of the country, where the Delphiniums will not thrive, some of the Aconitums will be found to be pretty fair substitutes, as they thrive moderately well where the sun is only allowed to strike them through a leafy shade. If the soil around them is given a mulch 2 or 3 inches deep, to preserve moisture, they will flower all the better for it.

Propagation. By division in Fall or Spring.

ADONIS. The annual species, of which there are two, *A. æstivalis* and *A. autumnalis*, are more commonly grown than the perennials, of which there are five. *A. vernalis*, *A. pyrenaica* and *A. amurensis* are very elegant species for borders or rockwork. The last named species is one of the earliest plants to bloom out of doors: very heavy frosts do not seem to hurt the growth above ground in January and February. The flowers are large, yellow; the foliage much divided. It is very much used with Snowdrops in public parks.

Propagation. By seed is a rather slow method. Large plants will best stand division in early Autumn

ÆTHIONEMA. *Æ. coridifolium* is a slender, evergreen shrub, growing about 6 inches, suitable for edgings of borders or for rockwork. Other good species are *Æ. grandiflorum* and *Æ. pulchellum*. When in rockwork pockets give a mulching of leaf soil or moss to prevent baking of the earth and to keep the roots cool.

Propagation. Very readily raised from seeds which should be sown in Autumn and the seedlings put out early in Spring.

AGROSTEMMA (Lychnis). The species *A. coronaria* and its varieties are always satisfactory in the herbaceous border. The foliage is silvery throughout, the flowers are rose colored; *A. c. atrosanguinea*, crimson; *A. c. alba*, white; *A. c. hybrida*, rosy crimson. They grow from 1 to 2 feet high. *A. flos-Jovis* differs from *A. coronaria*, in having umbellate heads of bloom, with the foliage narrower. The flowers are purple or scarlet. Almost any kind of soil will suit them, but they must have full sunshine. All of the above are useful plants for florists to handle.

Propagation. Sow the seed in the Fall; keep in a cool house. As soon as the seedlings are large enough prick off into boxes. They may be put out in a coldframe very early in the season. Or by

sowing early in September the seedlings can be wintered in frames. They are also increased by cuttings and by division of the old plants.

AJUGA (Bugle Weed). The creeping or stoloniferous species are much used as dwarf plants for forming dense carpets, either on rockwork or in the open border. As they grow in dense masses they usually are self-supporting during the hot months. *A. reptans* var. *rubra* has dark purple foliage and is excellent for covering shady places. *A. r. variegata* is beautifully mottled with yellow. *A. genevensis* is a variable species with dull red, white or blue flowers; does well in shady places. They are especially suited for cemetery work.

Propagation. All of the above are readily increased by division either in Fall or Spring, or by seeds.

ALTHÆA (Hollyhock). One of the tallest growing herbaceous plants, also one of the showiest, the Hollyhock, *Althæa rosea*, may be called an old-fashioned flower, and it is doubtful if there has been any improvement in the size and shape of the bloom for a goodly number of years. A host of varieties used to be kept true to name years ago; these were perpetuated by cuttings, divisions and grafting on roots; but now the best sorts come tolerably true from seeds. The principal colors are white, yellow, pink, red and purple. Seeds to produce flowering plants within a year should be sown as soon as ripe—usually in August. Sow in a box of rather light soil and cover very lightly with screened moss. The seedlings being large from the start should be put singly in small pots, and as they get too large for that size, shift into two or three sizes larger. Keep them in a coldframe; give an abundance of ventilation in favorable weather so that they may become stocky and robust. The ground should be well prepared for their reception, otherwise they will not attain full size—6 to 8 feet tall—and only remain in bloom two or three weeks. The plants should be put out as early as the ground can be worked. Good kinds should be marked for seed as they bloom.

Propagation. By sowing seeds in August as they ripen, and following directions given above.

ALYSSUM (Madwort). In this genus there are several rockwork or border plants, which, in their seasons, make a good show while in bloom. *A. saxatile* and *A. s. compactum* are Spring bloomers. The plants are of a dwarf, shrubby nature with grayish-green leaves and dense heads of deep yellow flowers. *A. s. variegatum* has

the foliage marked with yellow blotches, which, when the plant is out of bloom, renders it more valuable than the type as an ornamental plant during the Summer. *A. gemonense* is nearly allied to *A. saxatile*, but is less hardy, and continues longer in bloom. *A. rostratum* grows about 1½ feet high and blooms later than any of the above named. The species and forms are not particular as to soil, usually growing very freely wherever planted.

Propagation. They are easily raised from seed, which should be sown in August and the seedlings kept in a light, airy position until large enough to be planted out. They are increased also by cuttings and by dividing the roots.

ANEMONE. The species *A. japonica* and its varieties are late flowering herbaceous plants, growing from 1 to 2 feet high, with large white or pale rose-colored flowers, useful for cutting. The varieties are *A. j. alba*, *A. j. rosea*, *A. j.* Whirlwind and Queen Charlotte. *A. alpina*, a European species, grows about 18 inches high, forming large clumps. The flowers are usually solitary, from 2 to 3 inches in diameter, white inside, purplish outside. There is a very fine yellow flowered variety of this named *A. a. sulphurea*. Both kinds are slow in making flowering plants from seeds. Among the slender, tuberous-rooted section, *A. apennina* and *A. nemorosa* are early flowering dwarf species well suited for naturalizing among deciduous, low-growing trees and shrubs, as they make most of their growth before the shrubs and trees are in leaf. During Summer, both young and old plants should be heavily mulched if the maximum number of flowers are expected from them. During dry weather the plants, if neglected, are apt to stand still and throw up only a few feeble looking flowers, so it is important that they be kept moderately moist by mulching. Short grass, leaves, or half-rotted stable bedding will answer. In this genus there are about 85 species, several of which have numerous varieties. Most of them are desirable plants, but some are weedy, and increase too rapidly in gardens.

Propagation. Root propagation is the method employed, and it may be done at almost any season, but preferably in early Spring. Dig up some of the oldest plants, saving even the small roots. Cut both large and small into pieces about 2 inches in length and put in boxes of sandy soil, covering the pieces with an inch of the same material. Keep fairly moist and in a cool frame. When the roots have developed growths from 2 to 3 inches high put in 3-inch pots, plunging these in ashes and keeping them covered for a few days.



ANEMONE JAPONICA

After the plants make a sufficient quantity of roots they should be put out in their permanent quarters, where preparation should be made for them in advance by having the ground deeply worked and well manured.

ANTIRRHINUM (Snapdragon). The varieties of *A. majus* have long been grown as hardy perennials in Europe. In the northern and middle parts the climatic conditions are more favorable for their growth in the late Summer and Autumn months, as they flourish best in a moist, cold atmosphere. In America, especially in the Middle and South Atlantic States, they are best treated as annuals, as the plants which survive the Winter are usually not in as vigorous a condition as could be wished. The principal colors are white, red, purple and yellow, several kinds having combinations of two or more of these colors. *A. Asarina*, from the south of France, has a trailing habit; the leaves are grayish green and of a clammy nature; flowers yellowish white. It thrives best in positions partly shaded from the sun. It reproduces itself freely from seeds which ripen in abundance and may frequently be seen growing in the chinks of shady walls.

Propagation. Cuttings may be put in during October and given the protection of a frame during the cold months. Or seeds should be sown late in September to have good-sized plants by the following Spring. The tops of the seedlings may be rooted quickly in the propagating bed of a cool house; or they may be grown from the start with a view of flowering them in pots, for which purpose they are entirely satisfactory.

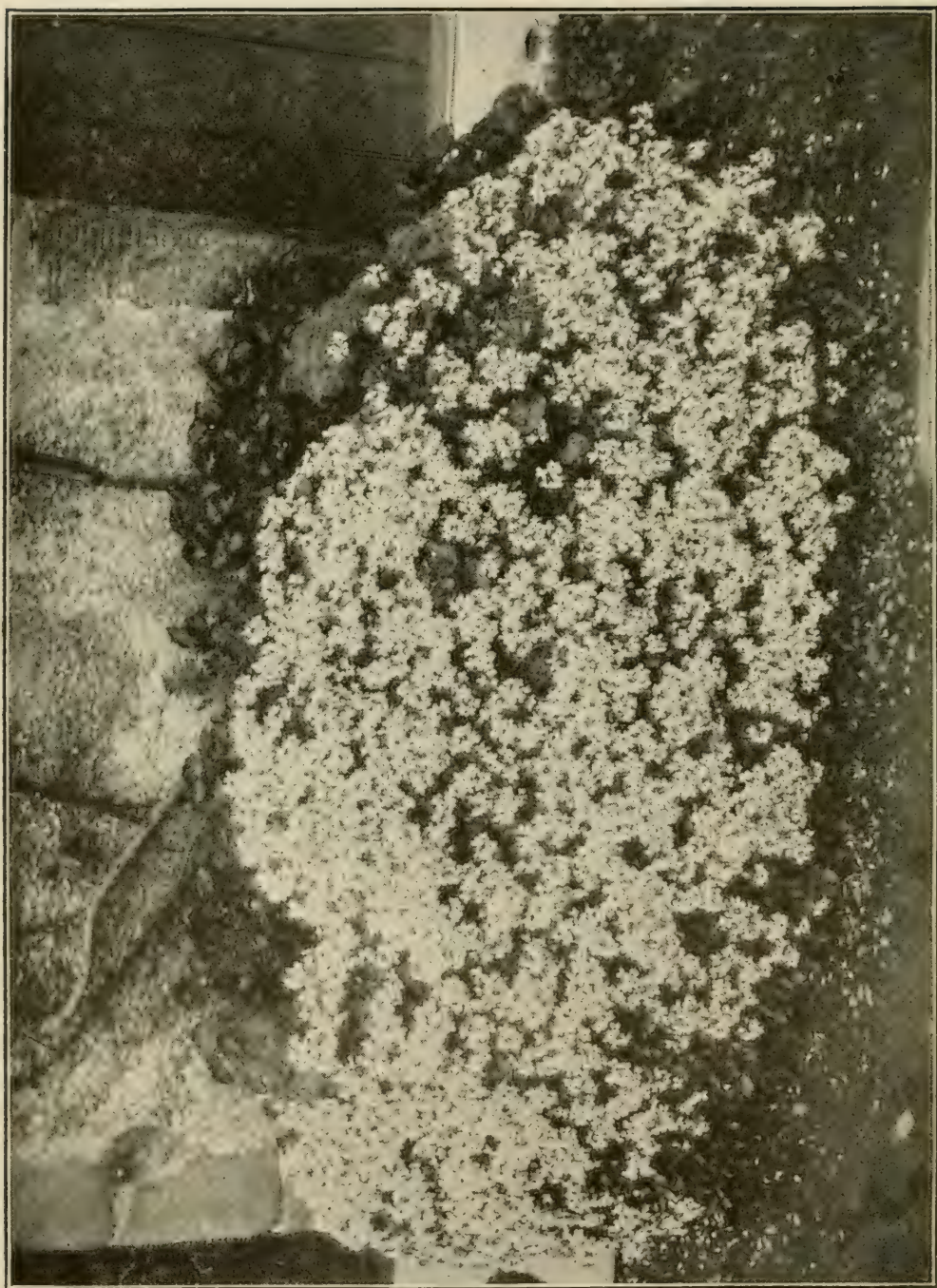
AQUILEGIA (Columbine). Hardy perennial plants with very showy flowers. The colors include red, white, blue and yellow; often there are two or more of these colors in the same flower. About 30 species are in cultivation. There are numerous varieties, the results of hybridization, most of which surpass the species in attractiveness as border plants. The *Aquilegia* is so easily hybridized that it is almost impossible to obtain plants from seeds true to name when two or more species are grown near each other; even with two species apparently very distinct, such as *A. chrysantha* and *A. flabellata*, they readily mix, but the progeny has a very undesirable combination of colors in the flowers. It is always advisable to protect a few flowers of the desirable species from the visitations of insects, so as to make certain of having the seedlings true. I have found the best way to do this is to flower a

few plants in pots and keep the blossoms covered with fine cloth while fertilization is in progress.

Among the red flowering kinds we have *A. formosa*, *A. californica*, *A. truncata* and *A. canadensis*; in white there are several, among the best being *A. californica alba*, *A. flabellata*, a dwarf-growing species with very ornamental foliage; *A. cærulea alba*, and *A. vulgaris alba*. The best of the yellows are *A. chrysantha* and *A. c. flavescens*. In the blue-flowered forms there is a large number to choose from: *A. cærulea* is a very satisfactory species; *A. vulgaris cærulea*, *A. olympica* are both good. In *A. glandulosa* the sepals are blue and the petals white. Several of the species and varieties are very easily forced into bloom, among them *A. flabellata*. It is a trifle later in coming into flower than *A. canadensis*, which usually is in full flower in this latitude by April 10. *A. chrysantha* is later in flowering. The Aquilegias have a habit of dying out after the second and third year.

Propagation. The seeds germinate irregularly when they remain long out of the soil, but when sown as soon as gathered they vegetate very freely, even in mid-Summer. Spring sowing is unsatisfactory, because the seedlings do not make desirable growth during hot weather, and often more than a year elapses before any flowers are produced. Sow in moderately light soil, and cover lightly with screened moss; keep in an airy, cool house. When the seedlings are large enough they may be pricked off into boxes, or round the edges of small pots of soil. Put them out in a frame when they are large enough to stand sunshine. If planted outside, where they are to flower, by the end of September they will make fairly strong crowns before cool weather sets in, and in the following Spring will bloom strong and vigorous. Any species which it is desired to increase in the absence of seeds should be lifted, divided and replanted early in the Fall, so that the pieces may have a chance to become established before Winter.

ARABIS (Rock Cress). Many of the species of Rock Cress are of no horticultural value and are seldom seen outside of botanical collections. Three of them, however, are among the most desirable of Spring flowering plants, and may be found in nearly every garden of any size. They are *A. albida*, *A. lucida* and *A. alpina*. *A. albida* is the best known; it forms a dense carpet, the stems being long and wiry, with dense rosettes of leaves at the ends. The flowers, which are pure white, are borne in great profusion, almost hiding the foliage. *A. alpina* is not such a free grower, but is equally suitable



ARABIS ALBIDA IN A ROCKERY

for rockwork, especially the variegated form. *A. lucida* is dwarfer than the other two; this has also a variegated form which should not be allowed to flower

Propagation. The variegated varieties should be propagated by division, or by cuttings put in early in the season. The green-leaved kinds are best raised from seeds, treated in the same manner as recommended for *Aubrietia*.

ARGEMONE (Devil's Fig). Most of the species grown in gardens are of annual duration. They will germinate outdoors late in Spring and develop very rapidly into flowering plants. *A. grandiflora* is a perennial with white flowers 3 to 5 inches in diameter, but not so free in blooming as the annual species. It must be given a position in full sunshine. *A. mexicana*, with its orange-colored flowers, called the Mexican Poppy, is also excellent.

Propagation. Seedlings should be pricked off into small pots as soon as the seed leaves are developed, as the roots will not endure much disturbance.

ARMERIA (Sea Pink). Of the Sea Pinks *A. vulgaris* is the best known. It grows in dense, low clumps, having narrow, grass-like leaves. The flowers are in close heads, on scapes only a few inches high. There are numerous forms of this species, with red, lilac, deep pink and white flowers. *A. cephalotes* has much larger leaves than the above, and the flowers, which are deep rose, or crimson, are borne on very long scapes. *A. plantaginea* is intermediate in size between the two first-named species, having pink flowers.

Propagation. The choicer varieties are best increased by division; the pieces should be potted in sandy soil in the beginning of October and kept in a close frame to encourage roots. All of the species are best raised from seed. Sow late in Autumn, in a cool house, prick off the seedlings and remove to a coldframe early to thoroughly harden off. In this section we put out plants of this class in the open ground as soon as it is in a workable condition, so that they may be well established before the hot weather arrives.

ASCLEPIAS (Pleurisy Root). The *A. tuberosa*, also called Butterfly Weed, is one of our most showy flowered native herbaceous plants. It is deep rooting, and is frequently seen growing luxuriantly in dry fields in positions fully exposed to the sun, with the surrounding herbage almost withered. It is late in blooming and valuable on this account. These are very showy and worthy of more attention. When cultivated in gardens the blooming period is longer than is the case with wild plants.

Propagation. In removing plants from their native places they should be taken only after they have completed growth. As many of the roots as possible should be saved, as the species dislikes removal. Raising plants from seeds is the most certain method of propagation. As they grow but slowly in the seedling stage, sow only a few seeds in a pot of rather firm soil, and allow the young plants to remain in these pots for at least a year before planting out.

ASPERULA (Sweet Woodruff). The species *A. odorata* is a slender growing plant of the Bedstraw family (Rubiaceæ), with pure white flowers in May. It will succeed in clumps if given a partially shaded situation, but it blooms only for a short season, and the foliage is not very attractive. It is sometimes grown in a quite satisfactory way in company with other plants, such as *Vinca herbacea*, *V. minor*, and even with varieties of the English Ivy when used for covering ground among shrubs and under trees. The flowers of the Woodruff appearing among the foliage of these plants makes an exceedingly pretty picture. The leaves, when dried, have a very agreeable aromatic odor.

Propagation. It is propagated by division and from seeds and increases rapidly.

ASTER (Michælmass Daisy, not China Aster). Nearly a hundred species and varieties of these popular border plants are offered by some of the European nurserymen. Many of the plants are indispensable for the ornamentation of the herbaceous border in late Summer and Autumn. They are all of free growth and will thrive in ordinary garden soil without much attention; but if the soil be worked deep, and well manured before planting, the plants will show the results of it in the size and number of flowers. Of *A. novi-belgii* there are numerous forms, some of them only 18 inches high and from that ranging to a height of 6 feet. The flowers are lavender or violet blue, rose and white; *A. novæ-angliæ* is one of the best-known species, tall growing, with purple flowers; its variety, *A. n.-a. rubra*, bearing rose-colored flowers, should always be included in collection. Other good forms of these Michælmass Daisies are catalogued by dealers.

Propagation. These Asters are best increased by division before starting into active growth.

ASTILBE. The *A. japonica* is usually known in gardens as *Spiræa japonica*. The Spiræas belong to the Rose family, while *Astilbe japonica* is classed with the Saxifragas, but *A. Lemoinei* is said to be a hybrid between *A. japonica* and a species of *Aruncus*,

which is also a rosaceous genus. If this be the case then both plants must necessarily be closely related, and if not of the same genus then they are of the same family. There are several fine varieties. *A. j. compacta* has more compact panicles than the type. *A. j. grandiflora* is larger; *A. j. variegata* has a yellowish variegation; *A. rivularis* makes a splendid border plant in this section, growing to a height of 5 feet, and blooming late in the season. *A. Thunbergii* grows about 18 inches high, and is much used as a forcing plant. In the border it thrives best in heavy, retentive soil. *Astilbe japonica* is better known as a forcing plant than as a subject for the hardy border. It is best grown in partial shade, for when in sunny places, unless kept supplied with water during dry spells, the foliage is apt to suffer before the close of the Summer.

Propagation. All of the species are propagated by division, in the early Fall.

AUBRIETIA. The *A. deltoidea* is a low-growing, evergreen, Spring-flowering plant, forming dense cushions of growth and thickly studded with small, purple flowers early in the season. There are numerous forms; some of the best are *A. d. Hendersonii*, more robust than the type, with deep, violet-blue flowers; *A. d. Eyrei*, a free-growing form, and *A. d. græca*, a large light-purple flowered variety. Aubrietias are well adapted for rockwork culture, as they like well-drained situations and rather light, loamy soil. They will stand full sunshine.

Propagation. The readiest means of propagation is by seed which may be sown early enough to have the seedlings established before freezing weather; or, the old plants may be divided and potted in sandy soil, keeping them in a frame during Winter, and planting out as soon as the weather will permit.

BAPTISIA (False Indigo). A native of the Southern States, *B. perfoliata* is but seldom seen in cultivation, but is hardy as far north as Washington. Owing to its beautifully arranged perfoliate leaves it forms a striking object in the herbaceous border. *B. australis*, probably the best, grows from 3 to 6 feet high; the flowers are blue. It seems to do best in deep, sandy soil. Raised from seed. *B. alba* and *B. leucantha* are white flowered species.

Propagation. The seeds are sown soon as gathered; kept in a coldframe they germinate the following Spring.

BEGONIA. The variety *B. Evansiana*, probably the hardiest of the Begonias, is also known as *B. discolor* and *B. grandis*. It is a native of China, Japan and Java. Notwithstanding the many fine

varieties of Begonias for bedding, this is one of the best for borders which get the benefit of full light from the north. (For the tuberous sorts see p. 70.)

Propagation. It is one of the species which form bulbels, or resting buds, in the axils of the leaves. These bulbels, when ripe, fall to the ground, and it is from them that the young plants grow late in the following Spring. They come safely through a temperature of several degrees below zero. The plants thrive best in the shade of dwellings, or anywhere except under the shade of trees, and in positions where direct sunlight reaches them during the middle of the day. The bulbels pass the Winter successfully fully exposed on the surface of the soil, but precautions must be taken to provide against rapid thawing and freezing. When the bulbels are left to themselves they usually sprout too thickly together. The weaker plants should therefore be thinned out, to give those which are left full opportunity to develop, otherwise their period of blooming will be short. To have plants early in bloom the bulbels may be harvested shortly after the plants are done blooming, kept during the Winter in a bottle and sown in time to have the plants in 3-inch pots by the middle of May.

BOCCONIA (Plume Poppy). *B. cordata* is probably the most imposing in appearance of all hardy herbaceous plants, making growths of from 6 to 10 feet high. It is a native of China and Japan, and very hardy. The plant has a grayish green appearance. The leaves are large and much cut or lobed. The flowers, borne in large, terminal panicles, are not showy, but they harmonize with the foliage. The plant is well fitted for isolated positions on lawns, among shrubs, or for large herbaceous borders. While thriving best in deeply worked, fairly rich soil it will succeed in stiff and poor ground.

Propagation. Seeds, of which a medium-sized plant will produce large numbers, are best for propagating in large quantities. They should be germinated in April and the seedlings potted off when small. The plant is also increased from suckers, which are produced in abundance.

CALLIRHOË. A genus belonging to the same family (Malvaceæ) as the Abutilon, *C. involucrata*, the most useful species, has long, trailing stems, with fair-sized purplish red flowers in the axils of the leaves. It spreads very rapidly during the Summer months. A good subject for borders of moderate width. In *C. i. lineariloba* the leaves are smaller—a good form for the rockery. It thrives in



BOCCONIA CORDATA

very dry soils, the roots penetrating to a great depth. They are of easiest culture and deserve great popularity. Old plants need to be frequently renewed, as they seem to exhaust themselves, probably owing to their rampant growth.

Propagation. They are chiefly propagated by seeds, but they may be also propagated by cuttings.

CALLUNA (Heather). *C. vulgaris* is seemingly as much at home in a hothouse at Washington as in the highlands of Scotland. It might be planted more commonly in shrubberies and thus relieve the monotony of some borders, by helping to give them a little more variety. In making a place for this plant, take some broken bricks and a bushel of peat, mix together and plant the Heath in it. They do very well for naturalizing. Cut branches keep their life-like appearance for months. After flowering the plants should be cut down to keep them bushy at the base and well-shaped. They prefer a sunny location.

Propagation. Cuttings are made from December to April, preferably from young plants, the tender shoots 1 inch in length being best.

CAMPANULA (Harebell. Bellflower). There is an amazing wealth of material in this genus. There are species that grow only 2 inches in height and others that are 3 feet tall. The biennials, *C. Medium* and *C. Medium calycanthema*, are the most commonly planted, the latter having the well-known cup-and-saucer arrangement. These and the *C. persicifolia* and its varieties, which are usually treated as biennials, have their seeds sown in late Summer and are wintered in a frame. *C. pyramidalis* and *C. persicifolia* are used as florists' flowers, the latter being the more useful. Of the *C. persicifolia* the variety *Moerheimeii* is the best white. Daisy Hill is also an excellent white of this species. *C. p. alba grandiflora* and *C. p. alba coronata* are good whites, the latter being of the cup-and-saucer type. *C. p. alba flore plena*, a double white, while it lasts, is one of the best Summer flowers. There are also single and double blue forms, all growing about 2½ feet high. Plants which remain in the ground over Winter will be benefited by a mulch of leaf soil and short manure around the crowns. Of *C. Trachelium* there are double blue and white forms; height 2½ feet. *C. Van Houttei*, a hybrid form with dark blue flowers, grows about 2 feet tall. *C. grandis* and *C. g. alba* are both good; height 3 feet. *C. pyramidalis* is the tallest species; height 5 feet.



CAMPANULA MEDIUM, CANTERBURY BELLS

Among the many dwarf trailers *C. carpatica* is probably the most popular. It throws up a great number of stems from a dense mound of compact growth. When in flower, it is the most attractive of hardy perennials. *C. isophylla* and *C. i. alba*, blue and white, are especially good for baskets or rockwork. Of *C. carpatica* there are several forms having blue, pale blue, lilac and white flowers. *C. c. turbinata*, a purplish blue, is dwarfer than the type, being especially suited for borders or rockwork. The Harebell, or Bluebell of literature, is the *C. rotundifolia*. It is rather attractive. *C. r. Hostii* is an improvement, having larger flowers and a stouter stem.

Propagation. Campanulas are raised from seed and by division or cuttings. Seeds should be started under glass. Cover very shallow and place in a light place at about 60 degrees temperature. Transplant seedlings in flats as soon as they can be handled. Harden young plants gradually and transfer to the open ground in May.

CATANANCHE. A plant with grayish green, long, narrow leaves, and blue or blue and white flowers borne on long, slender stalks. The species *C. cærulea* is of the easiest cultivation, and a desirable herbaceous plant, often used as Everlastings.

Propagation. Sow seeds late in the Fall and keep indoors; they will germinate very early. Prick off into boxes and remove to a coldframe when large enough.

CENTAUREA (Bachelor's Button). Of this genus *C. cyanus* is the Cornflower and *C. moschata* the Sweet Sultan. Both are annual in duration. Seeds will germinate in the open ground. *C. americana* is another good annual species which is sometimes grown for Summer cut flowers; the color is pale rose. *C. babylonica* is a good species to plant in the back part of an herbaceous border; the foliage is silvery white; flowers thistle-like, bright yellow. The plant reaches a height of from 6 to 12 feet. *C. montana*, the Mountain Bluet, is the perennial Cornflower, blooming during the greater part of Summer. There are forms with lilac, rose, red, white and sulphur colored flowers.

Propagation. Increased by division during the latter part of March, also by seeds.

CERASTIUM. *C. Biebersteinii* is a dwarf plant with a dense mass of growths; flowers pure white; in bloom during May. *C. grandiflorum* is a green-leaved species well adapted for growing in dense, carpet-like masses over rocks. The leaves are very woolly,

giving the plant a whitish appearance all the year round. It stands our hot Summers better even than the well-known *C. tomentosum* (Snow-in-Summer). This is a species with smaller and lighter colored foliage. Both are used for edging in beds or borders.

Propagation. The plants may be divided very early in the season with or without roots and replanted with long stems, deep in the soil, well firmed, and kept moist until they begin to grow.

CHAMÆBATIA. *C. foliolosa* is one of the plants which grow luxuriantly in the Sierras. Myriads of fine plants can be seen from the railway train. It is possibly the most beautiful of all the sub-alpine plants in cultivation. The leaves are very much divided, a bright green and the flowers are white. If ripe seeds were available, the plants might be more commonly seen than they now are.

Propagation. It is considered one of the choicest of the very dwarf shrubs in European gardens and tests the ability of the expert propagator to increase it. It can only be handled successfully by notching the stems and allowing the cut surfaces to callus before putting in the cuttings, but the plants used to be so rare in Europe that the above method was seldom attempted.

CHEIRANTHUS (Wallflower). The species *C. Cheiri* is a plant much grown in Europe, where the climate is very favorable to its perfect development. In the warmer parts of America its period of blooming is but a short one. In England it is a common plant on walls. The colors of the flowers are yellow, and reddish brown. Although a woody perennial, it should be renewed from seed, as the plants begin to fail after having bloomed one or two years. There are many fine double forms, some of which have varietal names.

Propagation. The seeds are sown in April, and as soon as large enough the seedlings are planted out where they are to flower the following Spring. Double flowering kinds can be raised from seed.

CHELIDONIUM (Double Celandine). The *C. majus flore pleno* is a reliable plant for half-shaded positions in woods. The double form is smaller growing than the single-flowered plant. The foliage of both has a bright green appearance for the greater part of the Summer. It is especially at home among damp rocks, growing in vegetable humus.

Propagation. In favorable positions it will reproduce itself from seeds.

CLEMATIS. During July and August one of the most useful plants for producing white flowers is the herbaceous Clematis, known as *C. recta*. It grows from 2 to 3 feet high and if in deep, rich soil the quantity of flowers to a plant is very large. In *C. heracleæfolia* (*tubulosa*) and *C. Davidiana* we have two blue-flowered species from China. The last named is fragrant. They are reliable plants for the herbaceous border, growing about 2 feet high.

Propagation. They are all increased from seeds sown as soon as gathered; also from division of the crowns, and by cuttings taken from the plants before coming into flower.

COREOPSIS. *C. lanceolata* and *C. l. grandiflora* are yellow-flowered composites, much used for Summer cut flowers. *C. verticillata* is of little service for cutting, but owing to the finely divided foliage it is a desirable border plant.

Propagation. Old plants may be divided, but they are best raised from seeds, and the young plants put out early where they are to bloom.

DELPHINIUM (Larkspur). *D. grandiflorum* and *D. formosum* have numerous fine varieties, which are much grown for cut flowers. The *D. grandiflorum*, 2 to 3 feet high, is one of the most stately of the Delphiniums. Its striking foliage remains beautiful throughout the whole growing season. It can be massed in the hardy border as close as 2 feet, but produces a fine effect when 4 feet apart. On account of its height it is usually planted well back in the border. The *D. formosum* is the most permanent form for naturalizing, being the hardiest. The species are numerous and there are superb hybrids catalogued by dealers, most of them being choice border perennials requiring deep, rich soil.

Propagation. They are propagated principally by cuttings of the young growths in early Spring, from seeds sown about the beginning of March, and by division of the roots when dormant in Autumn or late Winter.

DIANTHUS (Carnation. Pink). There are nearly a hundred distinct species, many of which are in cultivation. Most of them are desirable as border or rockery plants. They usually make dense tufts of grassy-like growths. Nearly all have attractive flowers. *D. barbatus* is the Sweet William. Good strains are procured from seed. *D. cæsius* (Cheddar Pink) stands our hot Summers well. A useful species for the rockery. *D. plumarius* (Common, Grass, or Garden Pink) is a universal favorite, being used as edging for beds.

There are double-flowered forms. *D. chinensis*, the Chinese Pink, is a biennial and should be treated as such, Autumn-raised plants flowering the best. There are many desirable varieties in this species. *D. alpinus* is one of the choicest of Alpine and rockwork plants. *D. glacialis* is a pretty Alpine species difficult to establish. *D. deltoides* (Maiden Pink) is one of the prettiest border Pinks, making neat mats of foliage, bearing profusely of the little bright red flowers.

Dianthus like a warm soil, and one that will not become too wet at any time, especially the perennial kind, as they are killed from too much ice around them.

Propagation. All Dianthus are readily propagated from seeds sown in rich soil. The double kinds are best propagated from cuttings alone to have them true. Another method is by layering, and with the garden Pinks or forms of *D. plumarius*, it is the easiest and surest.

DICENTRA. *D. spectabilis*, Bleeding Heart, is one of the most beautiful herbaceous plants in cultivation, flowering usually in May, splendidly adapted for forcing. It is one of the first plants to push its growths above the soil. In some localities it is apt to suffer from late frosts. *D. eximia* is not so tall growing as the above-named; the leaves are more finely divided and the flowering period is much longer.

Propagation. The time for propagating is just before the plant starts into growth. Division of the crowns is the most reliable method. Dig up the plants, saving every root; wash free of soil and preserve every piece of the plant having a bud. Those pieces of the roots which are not necessary to the buds should be cut into lengths of about 3 inches and put in boxes, keeping them uniformly moist. While they will not all grow, a certain proportion of them will pay for the labor. The divided pieces may be potted or boxed, according to fancy, using sandy soil to induce a good growth. Pieces of the crown on which there is a number of buds, but not enough roots to warrant further division, may be gently forced into growth, and when the young shoots are of sufficient length, taken off and rooted.

DICTAMNUS (Gas Plant). *D. albus* (*Fraxinella*) is a good, old-fashioned border plant, growing 2 feet in height, with spikes of red or white flowers. The plants should be given a good permanent position, as they dislike removal. An interesting fact connected with the *D. albus* is that the seed-pods emit an oil when ripe. Hold-

ing a lighted match near them on a still Summer eve will cause a flash.

Propagation. They are more easily propagated from seeds than by division. Sow seeds in Fall as soon as they ripen.

DIGITALIS (Foxglove. Witches' Thimbles). One of the most stately of hardy perennials. The flowers are large and bell-shaped, being arranged in very long racemes. *D. purpurea* is usually treated as a biennial. It is excellent for hardy borders, giving an appearance of strength to the usual rambling lines. The color is usually rose and white.

Propagation. Plants are easily raised from seeds.

DODECATHEON (Shooting Star. American Cowslip). *D. Meadia* grows in shaded positions, but it makes most of its growth while the surrounding trees are leafless. It has stems 2 feet long with Cyclamen-shaped flowers. The stamens come to a sharp point and seem to be shooting ahead, while the petals fall behind like the tail of a comet. *D. Clevelandii* and *D. Hendersonii* are Californian species of great beauty. The soil is composed largely of vegetable humus. Most of the species thrive well, but are not much grown in gardens; this is probably because their period of bloom is short and the plants are apt to be lost sight of and neglected when out of bloom.

Propagation. The seeds should be sown in places where they can remain undisturbed for at least a year, as after germinating little progress is made the first season beyond the formation of a root stock. They can also be propagated by division, which is the faster method.

DORONICUM (Leopard's Bane). The Doronicums are useful plants, with yellow, Daisy-like flowers, blooming in May. *D. plantagineum excelsum* is one of the best. Other good kinds are *D. austriacum*, *D. caucasicum* and *D. Pardalianches*. The plants are of easy culture in rich loam, the flowers being excellent for cutting.

Propagation. They should be increased by division in the Fall.

DUCHESNEA (Fragaria. Rock Strawberry). The flowers of *Duchesnea indica* (*F. indica*) are bright yellow. The fruit is dark red and produced all through the Summer and early Fall months. It is useful as a basket-plant or as a low ground cover. The flowers are solitary on the runners.

Propagation. Increased by roots formed by the runners.



DIGITALIS

ECHINACEA (Purple Cone Flower). *E. (Rudbeckia) purpurea* is a purple Sunflower; should be grown in the herbaceous border, as it is a showy perennial. It reaches a height of from 2 to 3 feet.

Propagation. It is increased by division and by seeds.

ERODIUM (Heron's Bill). *E. Manescavi* is one of the finest herbaceous plants for rock gardens or for the edge of a border. It is closely related to the Geranium. It can withstand extremes of heat and cold and should have a conspicuous position. There is a steady succession of bloom from June to August. It is a native of the Pyrenees. It grows to a height of 18 inches, having strong, rosy-purple flowers.

Propagation. Can be propagated by division at almost any time, or by seeds planted in the Spring.

FERULA (Giant Fennel). *F. communis* is probably the best known. The flower stalk is about 10 feet tall. Its great beauty lies in its striking foliage, which is almost as fine as some species of Asparagus. Sometimes new leaves appear shortly before frost and these persist over Winter. It is one of the earliest plants to show above ground in the Spring. It goes to rest before the end of July.

Propagation. By seeds. Although seedlings take a long time to make maximum-sized plants they are worth waiting for. About the middle of March is the best time to sow the seed, so that they can make as much growth as possible before the resting period.

FUNKIA (Plantain Lily). A small genus of very handsome foliage and flowering plants of the Lily family. Most of them are from Japan. Sometimes called *Hosta* or *Hostia*. Their masses of root leaves, as well as their white and bluish flowers, are very ornamental. *F. ovata* has bell-shaped blue flowers and ornamental leaves. The variety *F. o. marginata* has the foliage margined with white. *F. lancifolia* has short, narrow leaves with a pale lilac flower. *F. Sieboldiana* is a strong-growing species, with large, glaucous leaves. The flowers are white, tinged with lilac. It is a very desirable species, thriving well in sun or shade. *F. subcordata* is the commonest species found in old yards. It has very large, pure white flowers on long stalks. The leaves are light green, but somewhat soft. It blooms late in the season, preferring partial shade.

Propagation. By dividing the clumps. Some species produce seeds freely and seedlings can be grown readily if seed is sown as soon as ripe.

GAILLARDIA (Blanket Flower). There are several handsome-flowered varieties in cultivation. They are exceedingly effective border plants. Besides, they are also useful for cut flowers, lasting a long time in water. *G. pulchella* var. *picta* is an annual and attains a size of about 2 feet. The flower is yellow, varying to red, particularly at the base. *G. aristata* has given rise to the best perennial sorts.

Propagation. By division, seeds or cuttings in August or September. Also by root cuttings taken in the Spring.

GALAX. *G. aphylla*, the only species in the genus, is a dwarf evergreen, the leaves of which are much used by florists in forming backgrounds for floral pieces. It thrives well in partial shade in the rockery.

Propagation. By division before growth begins.

GENTIANA (Gentian). Although these are among the most beautiful of hardy plants they will not pay the florist to handle them. With one or two exceptions the kinds which are so popular in northern Europe do not succeed in the Middle Atlantic States. Our hot, dry Summers are against them. *G. Andrewsii* and *G. Saponaria* are both natives. They may be planted in half-shaded situations, where their roots will penetrate deeply.

Propagation. By seeds or by division.

GERANIUM. *G. sanguineum* is about the only satisfactory one in the genus for our hot, dry Summers. For rockwork it is probably the best all-round plant grown. It seldom invades the territory of other plants, never looks weedy, and is in flower from early till late. The flowers are solitary, about $1\frac{1}{2}$ inches across, crimson. It blooms from June to August. *G. anemonifolium* is almost hardy in Washington. It has attractive stems and leaves. It may be used in the rockery where it seeds abundantly.

Propagation. By division, or from seed sown shortly after mid-Summer and wintered in frames.

GILLENIA. *G. trifoliata* is one of our less common native perennials. It is an excellent, graceful plant with white flowers tinged pink and with red stems for the mixed border, rockeries or other hardy gardens. It is hardy and of easy cultivation in any good soil. It makes a good showing when naturalized with *Adiantum pedatum* and is well worth introducing to our gardens.

Propagation. Either by seeds or division.

GOODYERA (Rattlesnake Plantain). In European gardens the beautiful native species *G. pubescens* is much grown. The foliage is always in fine condition even in the hardest weather. It is very easy to transplant to our rock gardens and shady nooks or borders. This and the Trailing Arbutus, together with the Twin Flower, make a matchless combination in suitable spots.

GYPSOPHILA (Baby's Breath. Chalk Plant). *G. paniculata* is probably the most popular. Used for cutting, especially in the trimming of bouquets. The flowers are small, whitish, but produced in great profusion, in large panicles. *G. repens* (*prostrata*) is the best adapted for the rockery. It blooms from mid-Summer to Autumn. They prefer open, rather dry places.

Propagation. Either by cuttings in Spring or Fall; or by seeds, in which instance the seedlings must get all the light possible, as they are liable to get weak. *G. paniculata* var. *fiore-pleno*, the double sort is grafted on roots of the single-flowered form.

HELIANTHUS (Sunflower). The perennial species are, for the most part, useful late blooming plants. In favorable positions some of the species grow very tall. *H. decapetatus*, single flowered, usually grows about 6 feet high. *H. multiflorus* varies considerably; in some forms the florets are arranged like those in the Anemone-flowered Chrysanthemum; other forms have them of a uniform size. A most useful plant for supplying cut bloom. *H. scaberrimus* (*H. rigidus*) blooms in September. *H. orgyalis* is a species with fine leaves, growing 8 to 10 feet tall. They should be taken up in late Fall or early Spring every two years and the root-stocks divided and replanted; otherwise the roots will ramble away and the flowers deteriorate.

Propagation. They are among the easiest plants to increase by division.

HELLEBORUS (Christmas Rose). There are about a dozen species, with numerous varieties, principally of hybrid origin. All of them are well worth growing because of their early-blooming nature. *H. niger* is the true Christmas Rose (see page 22), which, under favorable conditions, will flower in December, and in colder parts of the country it blooms after one or two genial days. *H. n. altifolius* has flowers much larger than the type. *H. orientalis* (the Lenten Rose) has rose-colored flowers—one of the best in this latitude. Among its many varieties *H. o. guttatus* is white flowered with purple-spotted sepals. *H. o. colchicus*, a species with deep purple flowers, blooms early in March. They may be

planted in shrubby borders and rockeries, or if wanted for cut flowers they should be planted in beds. They are very sensitive to frequent changes of location and once established should not be disturbed.

Propagation. By root division. Seeds of most of them are freely ripened. If sown as soon as gathered, and kept in a cold-frame, they germinate well; but the seedlings take two or three years to make flowering plants.

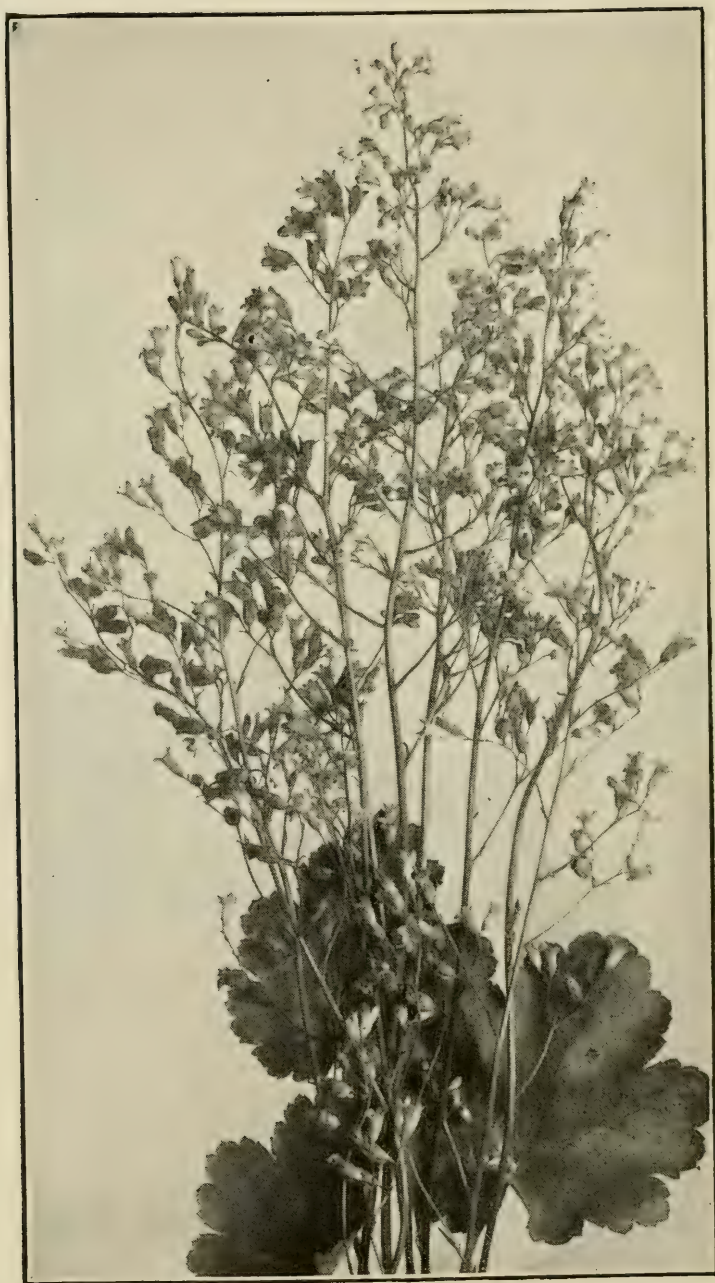
HEMEROCALLIS (Day Lily). *H. fulva*, the species so common in waste places all over the Eastern States, is not a native; but with *H. flava*, less commonly seen, it has escaped from cultivation. *H. minor (graminea)* is the earliest to bloom, opening during the latter half of May. *H. Dumortierii* has orange-yellow flowers tinged with brown. *H. Middendorffii* is deep golden yellow.

Propagation. The rarer species are successfully raised from seed sown in Summer as soon as ripe, and the young plants allowed to remain in the seed boxes until the following Spring, when they may be planted out in rows to increase in size. The double-flowered and variegated forms of *H. fulva* should be increased by division. They are all desirable border plants.

HEPATICA. One of the earliest Spring-flowering plants. In their native habitats they are usually found growing on southern slopes partially shaded by the foliage of trees and shrubs in Summer, but with the benefit of full sunshine when developing flowers and seeds. Of the species *H. triloba*, the varieties are very numerous, some of them having been long under cultivation in European gardens, where they are highly prized. *H. t. rubra* is bright red; *H. t. alba*, white; *H. t. cærulea*, lilac. There are also double red and double blue varieties, the former being very common, the latter somewhat scarce. *H. angulosa* is a distinct species, with very large, blue flowers. *H. angulosa* also has white, rose colored and lilac forms. They should remain undisturbed from year to year.

Propagation. It is easiest propagated by division in Autumn.

HEUCHERA (Alum Root. Coral Bells). Of this genus there are some twenty species native of North America, most of which are hardly worth cultivating. There is one, however, which is rightly considered as being among the most ornamental of late Spring blooming perennials; this is *H. sanguinea*. It has long panicles of reddish-pink or white flowers. Large plants which show signs of weakness should be lifted, divided, and replanted. They



HEUCHERA SANGUINEA

will need this treatment about once in two years, as they are inclined to get weak when they remain long in one place.

Propagation. Seeds should be sown during March, in the greenhouse. The seedlings are quite small at first, and they should be allowed to make considerable headway before being potted off. They are also propagated by division, October being the best month for dividing.

IBERIS (Candytuft). The perennial species are in reality dwarf, evergreen shrubs. They are attractive in appearance all the year round. They come in bloom the latter part of April and last till the end of May. There are about half a dozen species and varieties. *I. sempervirens* and *I. s. superba* are the best; they grow from 9 to 12 inches high. *I. semperflorens* is a taller growing species with large, pure white flowers. *I. Tenoreana* grows about 6 inches high. It blooms in May; flowers purplish white. *I. corifolia* has the flowers in flat, compact heads. *I. gibraltarica* is the largest of all; the flowers are white, tinged with pink. It is the most striking and showy of the perennial kinds. It is somewhat straggling in growth. *I. g. hybrida* is more compact, with the flowers at first white, changing to rosy purple. They succeed best when let alone. Once planted and not disturbed, they soon form a dense foliage.

Propagation. Although most of the species produce seed freely enough the seedlings are of a straggling growth for the first season. Much better plants are raised from good-sized cuttings taken at the end of September, and put in sand, in a cold propagating frame. If kept close and moist they will root well. The cuttings, when rooted, should be put in 3-inch pots, and plunged in a cold-frame for the Winter.

IRIS. There are fully 170 species; the varieties of some of them are numerous. The genus is divided into two sections. In one section, known as Xiphions, the species have bulbous, tuberous root-stocks; one or two of them, such as *I. reticulata* and *I. persica*, produce the flowers before the leaves. (Discussed on page 264.) In the second section many of the species have thick rhizomes, which creep along the surface of the soil, or a short distance beneath. To this section most of the very numerous garden varieties belong. They are known as German Irises, but having been in cultivation for a long time, it is impossible to tell just from what species some of them have originated.



IRIS MADAM CHEREAU
An Aphylla Variety

The species which are commonly included among the German Irises are *I. squalens*, *I. variegata*, *I. germanica*, *I. aphylla*, *I. florentina* and *I. sambucina*. Numerous varieties have sprung from each species, and from these there are evidently many cross breeds. *I. germanica* is a handsome species. The flowers of the known varieties of the *I. aphylla* have a white ground, with the margins marked



IRIS PALLIDA DALMATICA

lavender and purple. Mme. Chereau is a well-known form. The varieties of *I. amœna* have the standards usually white and the falls variously marked with violet blue. In *I. variegata* the very numerous varieties have the standards yellow; the falls are of a wide range of color—dark yellow, maroon, dark purple and crimson brown. The forms of *I. squalens* have the standards copper-bronze and fawn colored, and the falls among other colors are maroon,

purple, bronzy-yellow, violet and lavender. *I. pallida* has lavender standards, and the falls of the same color shaded with rose. *I. p. dalmatica* is a very large and sweetly-scented flower. The standards and falls are lavender. In the varieties of *I. neglecta* the standards range in color from lavender to purple and the falls crimson, purple, violet, white and intermediate shades. *I. florentina* is almost pure white, and comes into flower from the 15th to the end of May.

I. pumila, a dwarf species, is usually out of bloom early in May; it has many fine varieties. *I. pumila* and the German Iris have been crossed to give a semi-dwarf group known as Intermediate Iris. *I. cristata* is a native of the Eastern States, and is well adapted for half-shaded places in the rockery. It is the dwarfest of all the rhizomatous species. *I. versicolor*, Blue Flag, and *I. pseudo-acorus*, a yellow sort, although thriving under conditions which suit most of the garden forms, will do better when the soil is continually moist. *I. graminea* and *I. sibirica*, the Siberian Iris, are both worthy of cultivation; they have long, narrow leaves, and small flowers. *I. lævigata*, the Japanese Iris, better known as *I. Kämpferi*, will also thrive in borders, especially when given a deep mulch of well-rotted manure; but they show up to better advantage when grown in fairly moist ground. This species is one of the latest to bloom; it has many varieties, some of which are very large and showy. The expanded flowers, when used for cutting, will not stand much handling; but the buds, when nearly full size, will open out when placed in water; in this condition they may be shipped long distances.

Propagation. The rhizomatous species and forms may be rapidly increased by division. Large masses may be reduced in size and replanted early in March without interfering with the crop of flowers. In dividing into smaller pieces, it is better to wait until the plants have completed their growth, when they may be cut in small pieces, heeled in where they are slightly protected in Winter, and put in permanent positions in March or April. They will stand a rich soil, but should not be deeply planted, as they are then liable to decay during wet weather in Summer and Autumn.

KNIPHOFIA (Red-hot Poker). *K. alooides*, better known as *Tritoma Uvaria* (Torch Lily), is an old-fashioned border plant with long, narrow, dark green leaves and tall spikes of flowers, at first coral red, changing to orange, and subsequently to a greenish yellow. It is a native of South Africa, and in localities where the Winters

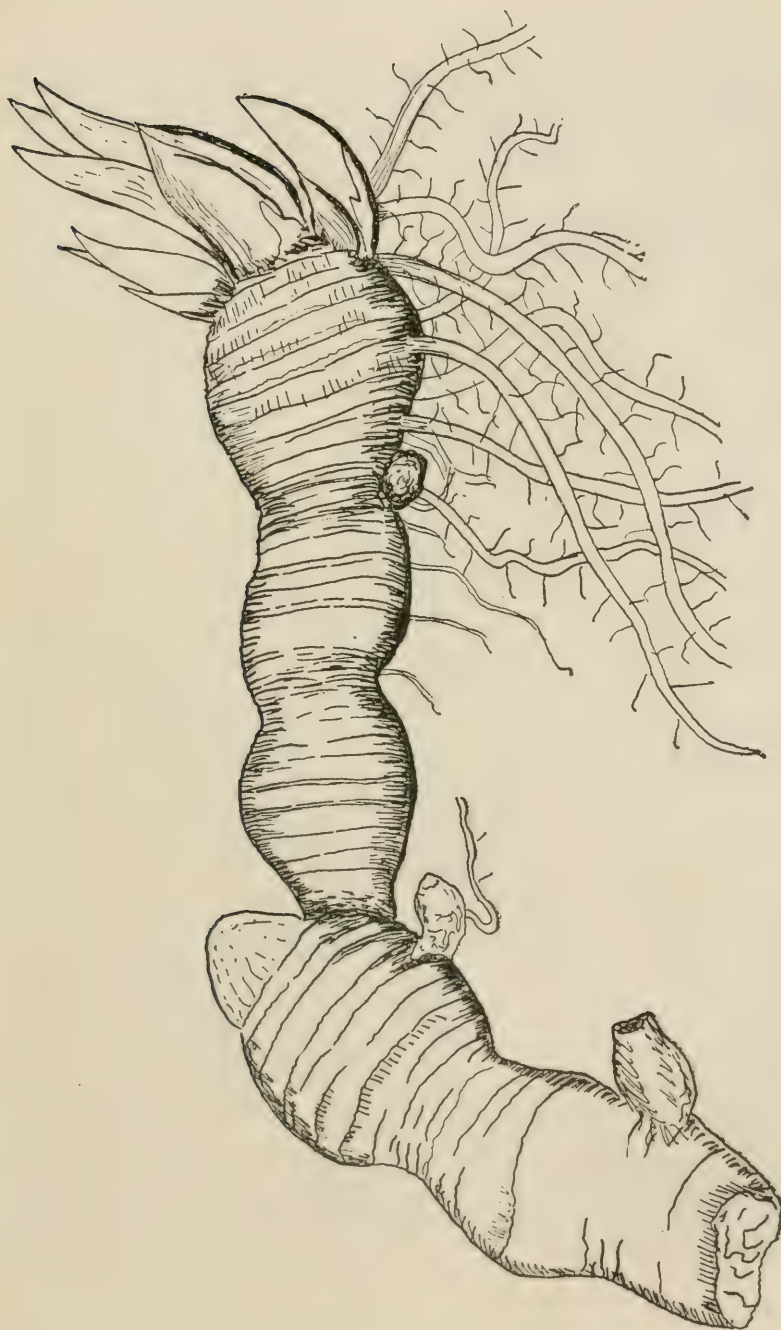


FIG. 18—RHIZOME OF IRIS



IRIS LÆVIGATA (JAPAN IRIS)—See Page 196

are severe it should, along with the other species and varieties, be protected by covering the crowns with half decayed leaves or stable litter. *K. a. maxima* has larger flowers. *K. Macowanii*, is an orange-red flowered species. *K. Leichtlinii* is one of the tallest of the genus and has bright yellow flowers. There are numerous hybrid forms, all of them desirable for the herbaceous border. They thrive best in deep, rich soil, and in fully exposed situations.

Propagation. Seedlings of most of the kinds may be raised, but they are somewhat slow in making flowering plants. Old specimens are easily divided, and give good sized pieces to start. Where a particular variety is wanted dividing is the best method of propagation, as they hybridize very readily and do not come true from seeds.

LEONTOPODIUM (Edelweiss). *L. alpinum*, although a native of the Alps of Switzerland, thrives luxuriantly when planted out on rockwork fully exposed to the sun. It is a low plant, 4 to 12 inches high, densely covered with a whitish wool, the attractive portion being the flat, star like cluster of woolly floral leaves surrounding the true flowers, which are small and inconspicuous.

Propagation. By seeds sown Feb. 1 to be placed in open border about May 1. Usually there are very few flowers the first year of sowing. Also propagated by division in the Fall and Wintering over in coldframe.

LESPEDEZA (Bush Clover). *L. Sieboldii*, also known as *Desmodium penduliflorum*. The plant has a shrub like growth, reaching from 4 to 6 feet in height. The flowers, which are small and pea-shaped, are very numerous produced in long, pendulous-branched panicles late in the season. The color is rose purple. *L. japonica* has pure white flowers, probably a form of *L. Sieboldii*, blooming a week or ten days later. They are very desirable on account of their late bloom.

Propagation. Cuttings taken before the flowers appear, will root freely. They should be kept indoors to encourage growth before going to rest. Old plants may be divided before starting into growth.

LEWISIA (Bitter Root). *L. rediviva* is a member of the Portulaca famly. It is quite a small plant, but its very large pink or white flowers are quite attractive. It is desirable for rockeries, needing perfect drainage, a sunny position and careful watering during the flowering period. It grows best in sandy soils

with rocks around it. It is the State flower of Montana, the starchy root being dug in the Spring by the Indians, and eaten. For best effect it should be planted in groups.

Propagation. By the fleshy root.

LIGULARIA (*Farfugium*). The fine Japanese plant *L. grande* is one of the best plants for the dwelling house. There is a beautiful kind with white spotted leaves which is supposed to be as hardy as the yellow spotted one, which, by the way, has stood outdoors at Washington, D. C., for the last 30 years.

Propagation. Old plants, with numerous growths, will stand division best in early Spring. Give the pieces a week in the sand bed previous to potting, in order to start new roots. They thrive well in a loamy soil, well drained. The pieces are potted after mid-Summer in a compost consisting largely of leafmold and sand, placed under cover of sash on the approach of cold weather, to preserve the leaves in a fresh state, and brought indoors when wanted to bloom.

LINDELOFIA. *L. longiflora* (*spectabilis*) is a low-growing borage-wort, with handsome, bluish-red flowers. It grows 12 to 18 inches high. It is a very reliable herbaceous plant, quite hardy and stands the sun well. Does well in any kind of soil. Winter kills easily and should be given a sheltered position.

Propagation. If seeds are sown late in Summer, the plants will bloom the following season. It is also propagated by division.

LINNÆA (*The Northern Twin Flower*). The famous *L. borealis*, although a humble looking plant, will never be seen in its native habitat by the ordinary observer, and yet it is the most beautiful and graceful of all our hardy plants, and plant-lovers who examine the flowers always admit its great beauty. It is found wild in Great Britain and in several places in Continental Europe. In America, it is found very abundantly in the Catskill mountains, in Maine, Colorado and is especially plentiful in the Canadian Rockies and in Washington State. When grown in a greenhouse in hanging baskets, the growths sometimes attain a length of over 3 feet. It was the plant selected by the immortal Linnæus to bear his name. It blooms from June to August. They are hardy in the North and are graceful, dainty plants for rockeries, preferring a shaded, moist position, and porous, peaty or humus soil.

Propagation. Usually by division; also by cuttings of soft or half ripened wood under glass.

LOBELIA. The native species, *L. cardinalis* and *L. syphilitica*, are, in this latitude, much more satisfactory than any of the gaudy-flowered forms of *L. fulgens* and *L. splendens*. *L. cardinalis* is among the handsomest of herbaceous plants; the flowers are bright scarlet. It must have abundance of water when growing. *L. syphilitica*, a blue-flowered species, will succeed well in a drier soil.

Propagation. By seeds planted in late Summer for flowering plants the following season.

LUPINUS (Lupine). *L. polyphyllus* is the most popular variety. The flowers are deep blue. *L. p. albiflorus* is a white form. *L. p. Moerheimii*, a recent introduction, is a beautiful, long-lived plant. The flowers are a combination of the dark and light shades of pink. All of the Lupines succeed in any good soil. However, they are said to have an aversion to lime. For best effect, they should be planted in masses. They bloom from June to September. Among the annuals *L. luteus*, a yellow, and *L. hirsutus*, the blue, are both popular.

Propagation. By division; also by seeds planted where the plants are finally desired, as they do not bear transplanting well.

LYCHNIS. There are numerous species in this genus which are desirable as border or rockery plants. *L. alba flore-pleno* (*L. vespertina*) has large, double white flowers. It blooms in May and June. *L. fulgens* is little grown in this country. The scarlet Lychnis, *L. chalcedonica* (Maltese Cross), grows about 2½ feet tall and blooms in June. *L. Viscaria* (German Catchfly) has an extended blooming period. It is an erect-growing plant, usually about a foot high, with rosy-red flowers. It has a sticky substance on the under side of the leaf which catches ants. It is seen often in old gardens and has a tufted habit. There are also double-flowered forms. They are all of simple culture requirements. (See page 202.)

Propagation. They are propagated by division. All of the species are easily grown from seeds, blooming the second year.

LYSIMACHIA (Loosestrife). Most of the species are of weedy growth and increase rapidly. *L. Nummularia* is the Moneywort, or Creeping Jenny; useful as a creeper or for hanging baskets or vases. There is a beautiful form with yellowish leaves. *L. clethroides* is a handsome species, growing from 2 to 3 feet high; the flowers, which are white, are arranged in long, drooping spikes. They are of easy culture, thriving best in a moist soil.



LYCHNIS VISCARIA VAR. FLORE PLENO

Propagation. It is readily propagated by division in late Autumn or early Spring.

LYTHRUM (Purple Loosestrife). The species *L. Salicaria* grows from 3 to 4 feet high. The flowers are of a rosy-purple color. They flower in Summer and are moisture-loving, enjoying swamps and low grounds.

Propagation. By division, seeds and stem cuttings.

MENYANTHES (Buck Bean). *M. trifoliata* is a good bog-plant. It does well in any moderately wet places, it being necessary always to keep the roots moist. It often grows in shallow water. It has creeping root-stalks and white or purplish flowers in Spring.

Propagation. By division of root-stalks.

MERTENSIA (Virginian Cowslip). There are several species of Mertensia all worth cultivating, but unfortunately some are not so easily grown as *M. virginica*. This is by far the showiest species and if the conditions under which it grows in a wild state are imitated, there will be no difficulty in its cultivation. In Spring most of its growth is made without shade—that is, before the trees are in leaf. It is usually found in damp woods. In this locality its period of blooming is from April 15 to the middle of May. It grows from 12 to 18 inches high. The leaves have a slightly glaucous hue; the flowers are arranged in drooping terminal clusters, reddish-purple in the bud, subsequently changing in the open flower to a beautiful light blue. It is one of our handsomest native plants.

Propagation. By division.

MIMULUS (Monkey Flower). *M. Moschatus* is an old-fashioned plant with a musky odor. It will keep in a frame during the Winter, and may be brought indoors early in the season, divided into small pieces and potted. It grows best in a shaded cool house, or it may be planted out in a moist, shady spot.

MONARDA (Horse Mint). These plants, although not averse to moisture, will thrive in very dry soil. There are several species, and one or two varieties common in gardens. The best known is *M. didyma*, a species with bright scarlet heads of flowers. *M. fistulosa* has purple flowers. *M. f. alba* is pure white. They are in bloom during mid-Summer.

Propagation. Among the easiest plants to increase by division, best done in the Spring, as Autumn-divided plants often winter kill.

MORINA. *M. longifolia* is a very choice perennial, reaching 2 feet in height. The flowers are produced in whorls arranged on a long stalk. The buds are white, changing later to pink and crimson. Often catalogued under the name of Whorl Flower. They are suitable for borders or rockeries.

Propagation. Seeds of this species are easily obtainable. When sown in Spring they do not bloom till the following year.

MYOSOTIS (Forget-me-not). In this genus there are numerous species, most of which are of little value. *M. alpestris* and *M. sylvatica* are commonly cultivated. *M. alpestris* is a dwarf form. *M. dissitiflora* is a biennial, its leaves are white-edged. There are blue, white, and pink forms. In Washington, D. C., they are planted in the Public Gardens, and along with Pansies they bloom during April and May. They are sometimes effectively used among Hyacinths and Tulips, in well-protected spots, keeping up a good display of bloom until the time arrives for filling the beds with their usual Summer occupants. Forget-me-nots prefer moist, half-shady places, but an open sunny border will do if not too dry.

Propagation. Seeds may be sown late in Summer to have bushy flowering plants for Spring blooming. They are also propagated by division and cuttings.

ÆNOTHERA (Evening Primrose). Handsome plants for rockwork or border. *Æ. Lamarckiana* grows to a height of 5 ft; flowers yellow. It is biennial in duration. *Æ. Fraseri* is a dwarf species suitable for the rockery. *Æ. missouriensis* has large, yellow flowers on trailing stems. *Æ. alba (taraxacifolia)* is a trailer, with very large pure white flowers opening at night. Plants come up freely from self-sown seed. *Æ. eximia* is a choice dwarf species with very large white flowers. The *Ænotheras* are of wide distribution in North America. They are open-ground, sun-loving plants. Some of them grow on the seacoasts and others in moist ground. All do well in ordinary garden soil.

Propagation. All of the kinds are raised from seed sown in September. They are also raised from cuttings.

ONONIS (Restharrow). *O. rotundifolia* is a very desirable dwarf, shrub-like plant, with Pea-shaped, Rose-colored flowers. A native of Southern Europe. It is of easy culture in border and rockery, not liking too much shade.

Propagation. By division or by seeds.

ONOSMA. *O. stellulatum* var. *tauricum* is a dwarf, evergreen plant, forming dense tufts of narrow, hairy leaves. The flowers, which are bright yellow, tubular, and $1\frac{1}{2}$ inches long, are arranged in branching cymes. It succeeds well on high ground or sunny rockery, with light, open, deep soil.

Propagation. The plant is best propagated by seeds, and by cuttings of the ripened growths taken during the end of September. They must be rooted cool.

OPHIOPOGON. The most useful species of these dwarf evergreen plants is *O. gracilis*; it is used for planting in dense shade where few other plants thrive. The leaves are narrow; flowers small, white, followed by beautiful blue berries, which continue on the plant all Winter. *A. Jaburan* is a taller species; the variegated form is a handsome plant. *O. japonicus* has also a variegated form. It is used much as a dark green lawn-cover standing well in a drought. It needs no clipping and does well under the shade of trees.

Propagation. Increased by division in Spring.

OROBUS (Bitter Vetch). The species *O. vernus*, often classed under *Lathyrus*, comes in bloom during April and lasts only for a short time. The flowers on opening are purple and blue, the purple changing to blue as the blossoms mature. They differ from the *Lathyrus*, in that they have no tendrils. There are several other desirable species, such as *O. pannonicus*, *O. flaccidus* and *O. aurantia*. The above are seldom listed in American catalogues. They are of comparatively easy cultivation.

Propagation. Seeds should be sown as soon as ripe. As the plants make but little headway during the first season they should be allowed to remain in the seed pan till the following Spring.

PACHYSANDRA. There are only two species in this genus, both of which are in cultivation. *P. procumbens* is a North American plant. The flowers are very inconspicuous, produced in March and April at the bases of the stems made the preceding year. In *P. terminalis* they are situated on the ends of the shoots. Both species are evergreen. *P. terminalis* is of a brighter green than *P. procumbens*. They are very useful for planting under trees; are deep-rooting and stand drought well. They are good for rockeries.

Propagation. Easily propagated by division.

PÆONIA (Pæony, Peony, or Piony). This genus is divided into two sections or sub-genera—shrubby (see p. 326) and herba-



PEONY FESTIVA MAXIMA

ceous; the last-named section is subdivided into three groups, with well marked botanical characters. The double-flowering herbaceous kinds, which bloom during the latter part of May and in June, are varieties of *P. albiflora*. There are hundreds of kinds in cultivation, varying in color from white through the different shades of pink to deep crimson. Their successful culture demands a deep and well-manured soil, with a heavy mulching of manure during the Winter and Spring months. The varieties of the European Pæonies come into flower several weeks in advance of the Chinese varieties. *P. officinalis* has double rose, red, and pinkish white forms and they are earlier to bloom than the *P. albiflora* varieties. *P. paradoxa fimbriata* has double purple flowers. *P. tenuifolia flore pleno* bears medium-sized double flowers, bright crimson in color. The leaves of this species are of a feathery nature. It is one of the most distinct and handsome Pæonies in cultivation.

There are several showy European species, some of which have numerous single-flowered varieties. They all bloom much earlier than the Chinese Pæonies, and are useful for the embellishment of the herbaceous border and for cutting. *P. anomala* blooms during the first week in May; this sort is sometimes sold as *P. tenuifolia*. The leaf divisions are fewer than in that species and broader. *P. arietina* is the earliest species to flower, expanding in this locality by the end of April. There are about a dozen distinct varieties. *P. Wittmanniana* is another early bloomer. Of *P. officinalis* and *P. peregrina* there are numerous single-flowered varieties.

Propagation. The herbaceous Pæonies are increased by seeds and by division of the crowns. The seeds are sown as soon as ripe, so that they may germinate the following Spring. They should be sown in a frame, and allowed to remain for a year before transplanting. Old plants are best divided in October; except with rare kinds the divided pieces should be large. Plant deep enough to make certain of the crowns being well beneath the surface.

PAPAVER (Poppy). In the herbaceous section of this popular genus *P. orientale* and its variety *P. o. bracteatum* are the most important kinds. There are several forms of each, varying chiefly in the colors of the flowers. Most of them are of different shades of scarlet, and very large. The plants, according to variety, vary in height from $1\frac{1}{2}$ to 3 feet. They bloom during May and June, according to locality. *P. nudicaule* is a choice species with orange, yellow or white flowers. The double forms are often grown for cut flowers.

Propagation. The stock of *P. orientale* is best increased by seed. When the capsules show signs of ripening they should be carefully watched, as they open at the top, and a slight movement of the atmosphere will displace the seeds. Sow in boxes soon as ripe, but not too thickly, so as to do away with the necessity of pricking off—an operation which does not succeed as well as could be wished. The seedlings will make sufficient headway to pass the Winter without freezing injury in a coldframe. During March bring into a cool house, and when they show signs of growing, pot off into 2½- or 3-inch pots, according to size. They should always be planted from pots, as they do not lift well. In the warmer parts of the country the plants of *P. nudicaule* will succeed fairly well if they be raised from seed sown during September, and either planted out late or wintered in a frame and put out very early. In the colder parts plants are freely raised from self-sown seed. It is a species which dislikes extreme heat.

PENTSTEMON (Beard Tongue). The garden varieties are the offspring of *P. gloxiniioides* and *P. Cobæa*. In localities where climatic conditions are favorable they are much prized. In this section they are short-lived, owing to the extreme heat. There are many extremely handsome species. *P. (Chelone) barbatus* and *P. b. Torreyi* will thrive almost anywhere, as they cover the ground with dense, short growths. The flowers are produced in panicles about 3 feet high; they vary in color from light pink to carmine. They should have good, deep garden soil. They thrive best with full exposure to the sun.

Propagation. They are increased by division or by seed. Seed is usually preferred, many of the varieties blooming the first year.

PHLOX. *P. subulata* (Moss Pink) is the parent of many beautiful forms extensively used for the edges of borders and for rockwork. In April they are covered with myriads of flowers close to the foliage. Among the white-flowered forms are *P. s. Nelsoni*, *P. s. aristata* and *P. s. nivalis*. *P. s. Vivid* has rose-colored flowers with carmine center. *P. s. frondosa* is a pink variety with dark center. Their propagation is usually effected by cuttings—a slow method. If the plants are kept supplied with water during September they will emit roots at the bases of the principal growths, and during October these may be cut up and heeled in on a sheltered border, potted, or removed to permanent positions, very early in Spring. Other desirable dwarf species are *P. amœna*, *P. reptans* and



PHLOX SUBULATA

P. divaricata. The well-known and deservedly popular herbaceous Phloxes are divided into two sections, early and late flowering.

The first or early blooming section is known as *P. suffruticosa*, being varieties of *P. glaberrima suffruticosa*. The late blooming section is known as *P. decussata*, and among the species which have contributed varieties are *P. maculata* and *P. paniculata*. The varieties are exceedingly numerous. In recent years some very beautiful forms have been sent out. They stand well as cut flowers. The plants should be lifted, divided and replanted every second year, as when they remain long without removal the panicles are small. Early in March is the best time for the operation. The growths will be much improved by a heavy mulching of manure about the crowns during the growing season.

Propagation Cuttings may be taken from the plants as they start into growth and rooted in a temperature suitable for Carnation cuttings; also by division and root cuttings. Seeds give new and interesting forms.

PHYGELIUS (Cape Fuchsia). *P. capensis* is hardy in places where the mercury does not fall lower than 10 degrees F. It endures the heat better than Geraniums. The trouble with this desirable plant is that it continues to grow during the Autumn months instead of going to rest. It can be planted as far north as Philadelphia if protected. It can be wintered in a coldframe.

Propagation. By seeds or cuttings. These cuttings should be taken from the Autumn growth of outdoor plants.

PHYSALIS. *P. Franchetii*, the Chinese Lantern Plant, is a most showy and striking plant. It has a red-colored calyx enclosing a large berry of the same color. The high colors do not develop until the fruit is ripe. They should be given a warm, sunny exposure.

Propagation. By seeds sown indoors and forwarded to the open ground; also by cuttings.

PLATYCODON. *P. grandiflorum* (Chinese Bell Flower) is an erect growing plant, with flowers resembling those of the Campanula. *P. g. Mariesii* is a variety of dwarfer habit, and bears larger flowers. The roots are thick and fleshy. The Platycodon requires a medium sand loam and does not succeed in either extremely stiff or sand soils. In the Fall the old stems should not be cut away, but be allowed to die away naturally; otherwise the crown may be injured.

Propagation. It can be propagated either by seeding or division. Seeding is more successful and a greater variety of flowers are obtained in this way. More care and skill are necessary in division on account of the fleshy root-stalk.

PLUMBAGO (Valloradia). *Ceratostigina plumbaginoides*, or as it is more commonly called *Plumbago Larpentæ*, is a hardy species, with deep blue flowers, growing to a height of one foot. It blooms from July till freezing weather.

Culture. The plants should be lifted during the first half of September, the shoots shortened back, and several pieces put together in 4-inch pots, saving as many of the creeping underground stems as possible. They require an intermediate temperature.

Propagation. Propagation is effected by division.

PRATIA. *P. angulata* is one of the most showy plants in cultivation. It is sometimes called *Lobelia littoralis*. It is a slender creeper, has white, star-like flowers, and is quick-growing. It is admirably adapted to rockwork. It does well in shady places. Where the Winters are severe, it should be lifted and wintered in a cold house.

Propagation. Quickly propagated by division; also by cuttings.

PRIMULA (Primrose). There are few of the species but what are worth growing. Many of them, however, are unsuited to the climate of the Eastern States, it being too cold in Winter and too hot in Summer. A few of the species and many of their varieties do well. *P. vulgaris* and the varieties with double yellow, red, purple, white, and lilac flowers succeed well if they are given water during the growing period. They will even stand in almost full sunshine, but they thrive best in half-shaded spots. *P. elatior* is the Oxlip, and what is known as the Cowslip is *P. veris*. Polyanthus is a garden race, said to be a hybrid between the last-named species and *P. vulgaris*. The different varieties are useful for rockwork and for borders. A good selection of forms may be had from seed sown in Spring; but the plants will not bloom until the second year. Some of the Himalayan species do fairly well in this latitude if given a position shaded from sun in Winter and mulched in Summer. *P. denticulata* and its forms are among the best. *P. sikkimensis* should be tried in damp, shady ground by the margins of lakes. *P. Sieboldii* produces pure white, crimson and lilac-colored flowers; very useful for cutting. The plants have creeping root-stocks, and thrive best

when protected by a frame in Winter. In the Fall those plants which are to remain in the open during Winter should be gone over, and those which have their crowns above the surface of the soil lifted and replanted, so that the roots may be protected.

Propagation. These sorts are best propagated by seeds or division very early in the season.

RAMONDIA (Rosette Mullein). *R. pyrenaica* is a dwarf Alpine plant with neat rosettes of leaves and beautiful, purplish-blue flowers. They require perfect drainage. They may be planted in small pockets in the rockery in a slightly shaded and elevated position and given good peaty soil.

Propagation. Old plants can be increased by division. Leaf cutting is another method. Seeds can be sown in the Spring, the small plants grown along in pots for the first Summer and kept in a cool, shady place, they will make neat little plants by the end of Autumn. They should be wintered in a coldframe.

RHEUM. Related to the Pie Plant. However, *R. nobile*, from the Sikkim Mountains, is one of the most beautiful plants in cultivation. It flowered at the Edinburgh Botanic Garden in 1879 and attracted great attention. *R. palmatum*, from an ornamental point of view, is the next best species, growing to a height of 12 feet. It really should be given a trial in the Middle West and California.

Propagation. Only by seeds which are easily obtainable from the Botanical Gardens in India.

RUDBECKIA (Coneflower). Nearly all of the species are worthy of a place in the herbaceous border. A few of them are valuable for supplying cut flowers. *R. speciosa* (*R. Newmannii*) grows from 2 to 3 feet high; the color of the outer florets is orange-yellow, while those in the center are almost black. *R. maxima* is a much taller species, valuable for cutting. *R. laciniata* attains a height of 4 feet. The variety known as Golden Glow has large, double yellow flowers; the best of all for cutting. *R. purpurea* (*Echinacea purpurea*) has purple florets. The Coneflowers are of easy cultivation, in almost any soil or situation, from a semi-shady position to full sun. If cut back severely when through blooming and well-watered it often produces a second crop of flowers.

Propagation. Some of the species are easily raised from seeds, but most of them may be divided freely if the work is done before they make much growth in Spring.



RUDBECKIA NEWMANII

SALVIA. The species *S. pratensis* has very long spikes of flowers in bright blue, rose and white. They flower in May, and are exceedingly attractive. They all seed freely, and if sown early in the Fall, will bloom the following Spring. *S. azurea* and *S. a. grandiflora* are tall-growing species, with blue flowers.

Propagation. They are easily increased from cuttings in the Fall months, also by Fall-sown seeds.

SANGUINARIA (Blood Root). *S. canadensis* is a dwarf-growing native plant that, in sunny positions, is one of the earliest to open its flowers, which are pure white, about 2 inches across. It is Spring-blooming and is used for borders and rock gardens. It prefers a light soil.

Propagation. It is increased from seeds and by division.

SAPONARIA (Soapwort). *S. officinalis* (Bouncing Bet) is naturalized over a wide area in the United States. The flowers are usually double. *S. ocymoides* is one of the best rockwork trailers. It passes the Winter with a mass of short growths near the crown; these, on the approach of warm weather, grow very fast, subsequently forming wide-spreading masses of light or dark pink flowers. *S. o. splendidissima* has rosy-crimson flowers. The plants are in full bloom during the latter part of May, with scattering flowers for a long time after.

Propagation. Seeds should be sown in September, and the plants wintered in a frame. Early planting is necessary. Also propagated by division.

SARRACENIA (Pitcher Plant). In the District of Columbia the only species which does not stand the Winter out of doors is *S. Drummondii*. *S. purpurea* is the hardiest of the number when plants are obtained from Northern sources. They should be planted in a mixture of peat, sand and moss, and the surface given a coating of moss, which must be kept damp, especially during the growing season. Pockets of suitable soil should be made for them at the margins of artificial lakes and ponds. Alkaline water is always detrimental. (For other species see page 153.)

Propagation. By seeds.

SAXIFRAGA (Saxifrage). The extremes of temperature in Summer and Winter work havoc with the great majority of the species, especially those of the mossy and encrusted sections. *S. peltata*, a Californian species, does grandly where it enjoys moist soil. The leaves are from 1 to 2 feet in length. The plant blooms during the latter part of April. *S. sarmentosa* (Aaron's Beard), a

Japanese species, has withstood the Winters here for a long number of years. The foliage is handsome, even in mid-Winter. There is a form with the leaves beautifully marked with creamy-white and red. The section to which *S. ligulata* belongs has some exceedingly handsome species, among which are *S. purpurescens*, flowering in May. *S. cordifolia*, with bright pink flowers, is frequently seen here peeping through the snow. *S. crassifolia* is another early bloomer. Partial shade is essential during the Summer. In Winter they should be given an ample covering of leaves.

Propagation. All of them are easy to increase by division. Some of them make offshoots by which the plants are easily propagated. Some make bulblets and are increased in this manner.

SCUTELLARIA (Skull-Cap). A rather large genus, embracing stove, greenhouse and hardy species. *S. baicalensis (macrantha)* is one of the best for outdoor use. The stems are at first procumbent, the flower spikes ascending. Our hot, dry Summers suit this plant well. It blooms during July and August. The flowers are purplish-blue, and are produced in great abundance. It grows about a foot high. *S. japonica* does equally as well as *S. baicalensis*, the flowers are much smaller. In *S. orientalis* the flowers are yellow; the plant grows from 9 inches to 1 foot high.

Propagation. By cuttings or by seeds.

SEDUM (Stonecrop). Many of the species differ from each other in habit; some of them are herbaceous plants. *S. spectabile* grows 2 feet high, forming large and neat clumps; flowers pink. It is the showiest of the Sedums and is used a great deal for borders. *S. Maximowiczii* is an erect growing species, about 1 foot in height, with yellow flowers. *S. maximum*, a very variable species, sometimes attains a height of 2½ feet. *S. Sieboldii* is quite hardy in this locality; it makes a fine plant for pots or baskets, but it does not associate well with other plants in the same receptacle. *S. acre*, *S. aureum* and *S. sexangulare* form dense growths from 2 to 3 inches in height. The yellow flowers are produced in great abundance about the beginning of June; their mossy-like growths are attractive all the year round. *S. spurium (S. stoloniferum)* has very handsome pink flowers, produced sparingly from mid-Summer till late in Fall. The Sedums prefer sandy soil; are averse to a wet position in the Winter. They grow readily where many other plants will not thrive.

Propagation. All of the species named are increased by division; also by seeds.

SEMPERVIVUM (Houseleek). Dwarf, succulent plants, well suited for dry, exposed positions in the rockery. *S. tectorum* is the species commonly grown. *S. arachnoideum* has small rosettes of leaves connected at the tips by a cobweb-like formation. Other well-known species are *S. calcareum* (*S. californicum*), *S. Funckii*, *S. hirtum* and *S. soboliferum*. They will thrive in almost any kind of soil. Houseleeks are cultivated more for foliage than for flowers. They are used considerably for carpet-bedding, rockwork and covering dry banks and sandy wastes. They are of easy culture.

Propagation. The hardy species are easily increased by division, also by means of the offsets or rosettes.

SILENE (Catchfly). In this very large genus there are three perennial species, each one growing only a few inches tall, which are among our finest rockwork plants. *S. Schafta* has bright purple flowers; it is a very deep rooting species, and stands dry weather well, keeping in bloom for several months. It can be raised from seed; or old plants divide well in October. Dig up the plant carefully, saving all of the roots, and in dividing give each piece as much root as possible; put in pots and keep in a coldframe for the Winter. *S. alpestris* is a neat growing little plant with white flowers. *S. maritima* forms a dense carpet of growth, the branches from a single plant covering a large surface. The flowers are white and are rather showy; they last only a short time, however. The foliage is handsome for the greater part of the year, being very neat and of a whitish cast.

Propagation. Seeds ripen in abundance; they should be sown early in September. *S. maritima* does not produce seed and must be propagated by division and cuttings. All of the other varieties may be propagated by division and cuttings.

SPIGELIA (Pink Root). *S. marilandica* is one of the daintiest of perennial plants. It is most pleasing in the herbaceous border. Shade is not necessary if planted in good, deep, rich loam. We are sometimes disappointed when we do not know the peculiarities of this plant, because it often peeps through the soil after many things flower and go to rest. Clumps of it persist in the same place for many years.

Propagation. It is easily raised from seeds.

SPIRÆA (Meadow Sweet. Goat's Beard). There are several very handsome herbaceous plants in this genus; all of them are of easy cultivation. *S. aruncus*, which may sometimes be found in

botanies as *Aruncus*, is a variable species; the plant found in the Eastern States seems much more dwarf than the one commonly cultivated in European gardens. To grow this plant to best advantage it should be given an isolated position. It usually attains a height of from 3 to 6 feet, according to variety. *S. astilboides* is often listed as Astilbe, and is dwarfer than the above named; flowers white, borne in dense panicles. *S. filipendula* is a valuable rock-work plant, the finely cut leaves remaining green all the year round. The flowers, especially those of the double variety, are showy. *S. palmata* is without question one of the handsomest flowered herbaceous plants in cultivation, but unfortunately other worthless kinds are often sold for it. The flowers are bright crimson, in large panicles; the leaves are palmately five- to seven-lobed. *S. ulmaria* (Queen of the Meadow) has creamy white, very fragrant flowers. *S. filipendula* and *S. ulmaria* are also listed sometimes under *Filipendula*. The plant grows from 2 to 4 feet high, and, like all of the others, it delights in damp soil, with partial shade during midday.

Propagation. They are all best increased by division.

STACHYS (Hedge Nettle). *S. lanata* is a valuable plant for hot, dry situations and for planting under trees. The flowers may be cut off as they make their appearance, as it is the foliage which is the most ornamental. The leaves are covered with a wood-like substance, imparting a whitish appearance to the plant. When wild it is often found in moist places.

Propagation. Increased by division at almost any time in Spring.

STATICE (Sea Lavender). Several species do well here as border plants. They need sandy soil with a little peat or leaf soil added. *S. elata*, *S. eximia*, *S. tatarica angustifolia* and *S. latifolia* are all good kinds. The flowers are often scarious and may be treated as Everlastings. The plants are easy to grow, remaining for some years when well established, rooting deep.

Propagation. They are raised from seeds.

STOKESIA (Stokes' Aster). *S. cyanea* is said to be found in a wild state only in South Carolina and Georgia. Fortunately, this splendid composite is not difficult to cultivate and produces seed in abundance. This comparatively rare plant will evidently not stand coddling; it seems to like ordinary field conditions. We ought to have more of this charming native in our gardens, as it is one of the really handsome things.

TANACETUM. There is little in the subject *T. vulgare* (Tansy) to recommend it, beyond its habit of keeping green and fresh-looking during the Summer. It is a favorite cottage garden plant. The flowers and foliage are very fragrant. The variety *T. v. crispum* with curled leaves is rather ornamental. It will thrive in almost all soils and situations that are not too wet.

Propagation. Increased by division or by seeds.

THYMUS (Thyme). *T. Chamædrys*, *I. lanuginosus* and *T. Serpyllum* are well suited for growing in dry and exposed parts of the rockery. They are low-growing and wide-spreading plants, with small leaves and flowers. *T. s. vulgaris* is the Lemon Thyme, a highly fragrant and ornamental plant, growing from 8 inches to 1 foot high. They are adapted to a variety of uses on account of their ability to persist in dry places. Some of them are especially adapted to rockwork.

Propagation. Easily propagated by means of division. *T. vulgaris* is often renewed by seedlings. Also well colored pieces of the plant are rooted in the Fall.

TIARELLA (False Mitrewort). *T. cordifolia* (Foam Flower) is a native species for shady spots in the front part of the herbaceous border, or on the rockery. It is a lover of cool, shaded places and of rich, moist soils. It is usually easy to manage. They are particularly attractive in the Autumn on account of their brilliant leaf-coloring.

Propagation. By means of runners thrown out after flowering, or by division.

TRADESCANTIA (Spiderwort). *T. virginiana* is found with blue and also pure white flowers. It is an extremely variable plant. This species and its varieties are useful for herbaceous borders. They do well in damp soil. Although commonly wild in many of our states, they are highly prized in Europe for planting in herbaceous collections.

Propagation. By division, seeds or cuttings.

VERBASCUM (Mullein). *V. olympicum* is one of the handsomest of a large number of species. It grows from 4 to 6 feet high. Although a perennial, it is best treated as a biennial. It is a good plant for the back part of a sunny border. They are of easy cultivation being adapted to any soil except a cold, wet one.

Propagation. By division or cuttings. Seeds are also used, but they seldom come true, as the *Verbascum* hybridizes very freely.

VERONICA (Speedwell). A large genus, including a number of shrubby species, principally from New Zealand. There are only a few herbaceous species which are worthy of a place in the garden, as the majority are of a weedy appearance and last only a very short time in bloom. *V. gentianoides* attains a height of 12 inches when in bloom. There is a handsome variegated form, the flowers of which should be removed, as this tends to induce growth at the base. *V. incana* has whitish foliage and deep blue flowers; it is best raised from seeds. *V. amethystina* is one of the best of the tall herbaceous kinds, growing about 18 inches high. *V. taurica*, *V. Teucrium*, *V. prostrata* and *V. satureiaefolia* are first-class rockery plants. *V. longifolia* var. *subsessilis* is a valuable sort for the border.

Propagation. By seeds or by dividing early in the season.

VINCA (Periwinkle). *V. herbacea* loses its foliage in the Fall. In April it makes short flowering growths, followed later by long, vine-like shoots, which take root at the extremities and form new plants. It thrives well in full sun. *V. minor*, the commonest kind, has blue flowers, also double blue, double purple, single white and variegated-leaved forms. It is much used in planting among shrubbery and for covering shady spots under trees. It will thrive in almost any position, and takes possession of the ground to the exclusion of most other herbaceous perennials. (For other Vincas see p. 292.)

Propagation. By division or by cuttings.

VIOLA. Pansies, (see p. 232,) Tufted Pansies and Violets are all members of the genus *Viola*, the use of the generic name for any one section of the genus has generally been discarded. The tufted Pansies or bedding Violas are hybrids from *V. cornuta*, *V. lutea* and *V. tricolor*. They spread at the root much more than the ordinary Pansies do, making a great mass of flowers, especially in cool climates, for the greater part of the Summer. Because Pansies have become so popular in this country the tufted Pansy would have a struggle for existence in the estimation of the ordinary flower lover. Although in the tufted Pansies there is a greater diversity of color, more graceful flowers, and the plants are very floriferous, the flowers are much smaller than in the ordinary Pansy, and it is a question if they would become popular. *V. hederacea* (*Erpetion reniforme*), the Australian Violet, is a very dwarf plant, covering the ground rapidly by means of runners, which are thrown out in great profusion. It blooms all Summer if given a shaded position on the



VERONICA SPICATA ROSEA

rockery. The flowers are small, blue and white; very showy. It will thrive in any kind of soil if kept slightly moist during dry weather. In the latitude of Washington, D. C., it is perfectly hardy.

Among the hardy Violas, *V. papilionacea* (*cucullata*) is the species most frequently grown in gardens. It often becomes a troublesome weed and keeps on producing apetalous flowers long after the long-stemmed showy blooms are gone, and from the short-stalked apetalous flowers large capsules of seed follow in almost every instance. *V. pedata* and its forms are among the earliest of our native species to bloom. *V. blanda* has pure white flowers, growing in dense tufts; this species delights in sandy soil. *V. pubescens* is the common yellow sort with leafy stems, and *V. rotundifolia* has naked flower stems.

Propagation. The various sorts may be increased by seed or division.



CHAPTER VIII

Annuals

Annuals are one-year plants. The seed is sown, the plants bloom, produce seed and die the same year. Many of our prettiest garden flowers are annuals. They are inexpensive, but give a wealth of exquisite bloom, quickly fill in spaces between other plants, are admirable for the rented house garden, or Summer occupied house and adapt themselves to a great range of soils and climates.

Time to Sow. Most annuals, except, perhaps, Amaranth, China Asters, Browallia, Torenia, Gourds and Butterfly Flower, may be sown in the open when the soil is in good working condition and warmed a bit. Many, however, including those just named are best when first started in the house window a little earlier than they can be sown out of doors. They are sown in shallow boxes or in flower pots. By keeping the soil warm and moist, they will readily germinate. The little plants, when up, must have a place in some window, close to the glass. Later in the Spring such plant boxes can be taken outside, and in a sheltered, warm place the plants will become strong and sturdy and soon of the right size for planting out.

Some of the fastest growing annuals need not be started until May. Of these, Zinnias, Marigolds, Stocks and Scabiosas are the best. Well known varieties, needing an early start and a careful removal from the seed-bed, or out of boxes into the garden border are: *Phlox Drummondii*, Chinese Pink, *Petunia*, China Aster, *Browallia*, *Lobelia*, Monkey Flower, *Ageratum*, Bachelor's Button, Ricinus (Castor-Oil Bean) and *Mirabilis* (Four o'Clock), Sweet Alyssum. Most of these should not be planted in the open before the middle of May, while a few, such as *Phlox Drummondii*, China Asters, *Petunias* and Chinese Pinks, may safely be planted out latter part of April, if they are not raised in too warm a place and are hardened off or weaned to the outer air.

Sowing the Seed. Most annuals especially *Petunia*, Ornamental Tobacco (*Nicotiana*), *Portulaca*, *Salpiglossis* and Poppy

are small-seeded; these are sown on the surface of the bed, then gently pressed into the loose soil and only slightly covered by again leveling the surface. Sunflowers, Sweet Peas, Morning Glory, Zinnia and Nasturtium must be planted somewhat deeper; Sweet Peas 2 or 3 inches deep. All the various places where seeds have been sown should be accurately marked in some way by sticks or labels, so that the tiny plants, when they appear above ground, may be easily found and distinguished, and not be mistaken for weeds, for it is an important procedure, the keeping down of weeds from their very start. Many annuals are better sown in a coldframe or seed-bed and transplanted to their permanent quarters later; however, the following should be sown where they are to bloom: Poppies, Mignonette, *Alyssum*, Sweet Peas, Candytuft, Larkspur, Sunflower, *Portulaca*, Morning Glory and *Centaurea*. The border or bed should be well dug, liberally enriched with good old manure, and neatly finished off by giving it the desired form and an even surface. After the thorough preparation of the bed, the spaces where one or the other of such varieties is believed to prove most effective when in bloom, are marked or staked off, considering well the habit, color and height of the plants when at their best.

Transplanting. In planting out, care is necessary. The work is best done in the evening or on a cloudy day. In very dry weather the plants should be watered right after being set out. Most varieties may be handled with safety at any time, if the plants have not been growing too crowded in the boxes or seed-bed. In such a case it is a good plan to thin out or transplant to distances of an inch or more into other boxes or frames when still very small. Such plants, if taken out with care, a ball of soil adhering to their roots, will not mind a transplanting into the garden later. Most annuals will benefit by having the top removed when 4 inches tall; they then become branchy, symmetrical and produce more bloom.

AGERATUM (Floss Flower). *A. Houstonianum* takes its place as one of the finest blue border and porch box plants. It is very tender, although it does not require much heat during the Winter. For continuous bloom keep the seed from forming.

Propagation. Lift old plants and keep in a greenhouse; they will give an abundance of growths for cuttings during the months of February and March.

ALYSSUM (Sweet Alyssum). This plant is one of the last to succumb to cold weather. In the city of Washington it is fre-

quently in bloom up to the middle of December. It is used for window boxes, vases and baskets.

Propagation. A few plants may be lifted, cut back and planted in the front part of a Rose or Carnation bench, where they will furnish abundant material for cuttings in the Spring. It is also raised from seeds which for a succession of bloom should be sown several times during the season.

AMARANTHUS (Amaranth). The value of the *Amaranthus* lies in the highly-colored foliage, no other class of plants surpassing them in this respect. In the hottest parts of the country they do not last long after attaining their full size, and may be successfully used among Canna plants, which have been set out in a semi-dormant state. The common sorts are: *A. caudatus*, Love-Lies-Bleeding, and *A. hypochondriacus*, the Prince's Feather; the former has flower stems resembling red cord, the latter has highly-colored leaves as well as a showy flower head.

Propagation. *Amaranthus* will germinate out of doors and make fair-sized plants, but to have them at their best the seed should be sown in the beginning of March, in a warm house, and near the glass, as the seedlings get very weak unless given all the light possible. As soon as large enough they are pricked off into boxes, and, when they reach the proper size, potted singly into 3-inch pots, planting them out from this size.

ARCTOTIS (African Daisy). The *A. grandis* is a most attractive daisy-like flower with petals white above and bluish beneath; the centers are steel-blue. It makes a rather good cut flower.

BRACHYCOME (Swan River Daisy). A charming little blue Daisy used for edging borders of annuals. The species most grown, *B. iberidifolia*, often bears blue, pinkish or white flowers a half inch in diameter.

Propagation. For best results the seeds are started in boxes in March.

BROWALLIA (Amethyst). *B. elata* is a blue-flowered annual species and may be sown where it is to bloom. In this locality the numerous varieties are hardy annuals. *B. speciosa* may either be raised from cuttings or seeds. When grown cool both are good Winter blooming plants for the conservatory.

CALENDULA (Pot Marigold). An old favorite of which there are now excellent golden yellow and lemon-colored flowers. *C. officinalis* is grown in the greenhouse and garden because of its

prolific production of long-stemmed flowers. It is of the easiest culture.

Propagation. Seed may be sown in open ground in early Spring or in greenhouse at any season.

CELOSIA (Cockscomb). There are a number of beautiful varieties of Cockscomb, *C. cristata*, and of the plummy and feathery *C. argentea*. The texture of the flower and the colors appear most silvery. They make attractive pot plants.

Propagation. The seeds should be sown in the early Spring for Summer use. The plants are moisture-loving.

CHINA ASTER (*Callistephus hortensis*). The China Aster is the best cut flower annual and the modern types have long stems, large flowers of beautiful colors; together with these qualities they last the longest of any annual used commercially. The principal points of the culture are summarized thus: Sow seeds in flats early and never let them become root-bound nor checked in any way, else they bloom before they attain their proper growth and perfection. Good seed is an important factor toward superior flowers.

CLARKIA. The Clarkias, especially *C. elegans* and *C. pulchella*, are most interesting annuals, bearing white, lilac or pink flowers. They do nicely in partial shade in a light soil.

CLEOME (Giant Spider Plant). *C. spinosa* is a tall-growing annual much used for herbaceous borders and for growing among shrubbery. It has a peculiar appearance due to the long stamens and seed vessels. The flowers are pink and so arranged as to give a light, airy appearance. If the seed vessels are removed as they appear the plants will last much longer in flower.

Propagation. It is always propagated from seeds which are sown indoors early in the season.

COSMOS. To have the plants complete their growth early the seed of *C. bipinnatus* should be sown indoors, or on a hotbed by the middle of March. Give the seedlings enough light to avoid weak growth. Plant out in rather sandy soil, and not too heavily manured. *C. sulphureus* has yellow flowers; late blooming plants of it may be lifted and put in large pots, or planted out in a bench where there is abundant headroom. When grown on stiff soil the plants lift easily. Some of the more robust shoots may be removed, owing to the loss of some of the roots in removing. In this way they will give a large quantity of bloom till frost.



PANSIES IN BORDER.—See page 232

Supports for the plants: We frequently see a very promising crop of *Cosmos* laid flat on the ground by a moderate wind storm, which not only breaks half, or more, of the branches, but the flowers on those which are left are at least a week later than usual in making their appearance and have crooked stems in the bargain.

COTYLEDON (Echeveria. Hen and Chickens). These are not annuals but are here described because they are frequently used for carpet bedding. Some of the best for this purpose are: *C. atropurpurea*, *C. californica*, *C. clavifolia*, *C. fascicularis*, *C. gibbiflora* var. *metallica*, *C. secunda* var. *glauca*, *C. imbricata*, *C. Pachyphytum*, *C. mirabilis*, *C. globosa* var. *extensa*, and *C. eximia*.

Propagation. The narrow-leaved kinds are raised in quantity from leaves; others from seed, offsets and from cuttings. November and December are the best months for propagation. Pull the leaves from the plants, taking care during the operation that the bud in the axil of the leaf is preserved. Make a depression, say 2 inches deep and 4 or 5 inches wide, across the sand bed of a warm house; lay two rows of leaves in this with their bases touching; keep dry until the little growths start. When large enough they should be pricked off close together in boxes. Old plants should be lifted in Autumn and placed as thickly as they will go in boxes, without adding much soil and keeping them without water in a cool house.

DIMORPHOTHECA (African Golden Daisy. Cape Marigold). *D. aurantiaca* is an extremely showy Daisy from the Cape of Good Hope, South Africa. Although, perennial, it is treated as an annual. It suits our climatic conditions perfectly. The bushy plants grow from 12 to 15 inches high; the flowers, which are 2½ inches in diameter, being a rich orange gold. Its strikingly brilliant coloring is enhanced by the black disc. They bloom the greater part of the Summer and Fall. *D. a. hybrida* is of similar habit to the parent. It varies in color from the purest white through the various shades of yellow and orange to rich salmon shades.

Propagation. By seeds. Can be sown in Fall and wintered in greenhouse.

ESCHSCHOLTZIA (California Poppy). *E. californica* sometimes survives the Winters in Washington. It will do this even farther north if the plants get a little protection, by spreading a few tree leaves over the plants. However, the seed is cheap and in the North this plant is used as an annual. The Burbank varieties,

which include variations in color, are welcome additions to the older kinds. There are several shades of yellow, pink, red and purple, also double-flowered forms, on the market. Home-saved seeds should be taken from the heads with the largest flowers.

Propagation. As they are not easily transplanted the seeds should either be germinated in small pots or sown where the plants are to bloom.

GAZANIA. *G. rigens* is a decumbent composite plant from South Africa, of a somewhat succulent growth, and succeeding well in partially shaded positions. In the Northern States the Gazanias thrive in full sun. The flowers are large, deep orange.

Propagation. Owing to the succulent character of the plants the cuttings are liable to decay when placed in wet sand. Put them in boxes, using sandy loam. Make the soil quite firm; give one good watering, then put in the cuttings and keep in a cold but close frame until rooted. This may be done about the end of September; on the approach of severe weather bring the boxes into a cool greenhouse and pot off in early Spring.

GODETIA. The Godetias are attractive because of their satiny flowers. *G. amœna* is taller than the others, and bears pink, lilac and deep red flowers. *G. grandiflora* only grows from 6 to 13 inches tall and has attractively blotched flowers larger than the former species.

Propagation. Seeds are sown in the Spring, although they sometimes self-sow in warm climates.

HELICHRYSUM (Everlasting). The Helichrysums are the largest-flowered Everlastings. *H. bracteatum* is a bold sort grown lately by florists for Winter decoration. The flowers are clear yellow, crimson, scarlet and blood-red. Double sorts are catalogued as *H. monstrosum*. It is an annual.

Propagation. Sow seeds indoors or in the open ground early in the Spring.

HUNNEMANNIA (Mexican Tulip Poppy). *H. fumariæ-folia*, for late Summer and Fall cutting, beats all other members of the Poppy family. The flowers resemble those of some of the Eschscholtzias, to which genus it is closely allied; but there is much more substance to the flowers of the Hunnemannia and also to the flower stems. They can be cut immediately after opening and kept in excellent condition for several days. It thrives well in sandy soil, and needs but little attention in the way of watering after

planting out. It sometimes stands the Winters in the District of Columbia, but oftener it gets killed outright, and is, therefore, treated as an annual.

Propagation. Seeds of the earliest flowers will have ripened by the end of September. They should be gathered and laid away in a cool, dry place for sowing in early Spring, taking care not to burst the seed vessels. The only difficulty attending the cultivation of this Poppy is in the seedling stage. The young plants are difficult to transfer from the seed pan to small pots, but this can be avoided if the seeds are sown in small pots, with the soil firmly pressed before sowing and shifted on as the plants require it.

KOCHIA (Summer Cypress). *K. trichophylla* is an annual plant which has jumped into popularity suddenly, having only been grown for ten or twelve years. It does not mix well with other things. It is often used as a temporary border or hedge plant. The growing plants develop a surprisingly large number of branches in a comparatively short time after germination, and some plants perfect enough seed which if they all grew would cover half an acre of ground. The plants turn to a bad purplish red in Autumn.

LINUM (Flax). *L. grandiflorum* has several scarlet and crimson varieties which do well from seeds. *L. perenne* is quite hardy and well worth growing in rock gardens or in the border; there are two colors, white and blue.

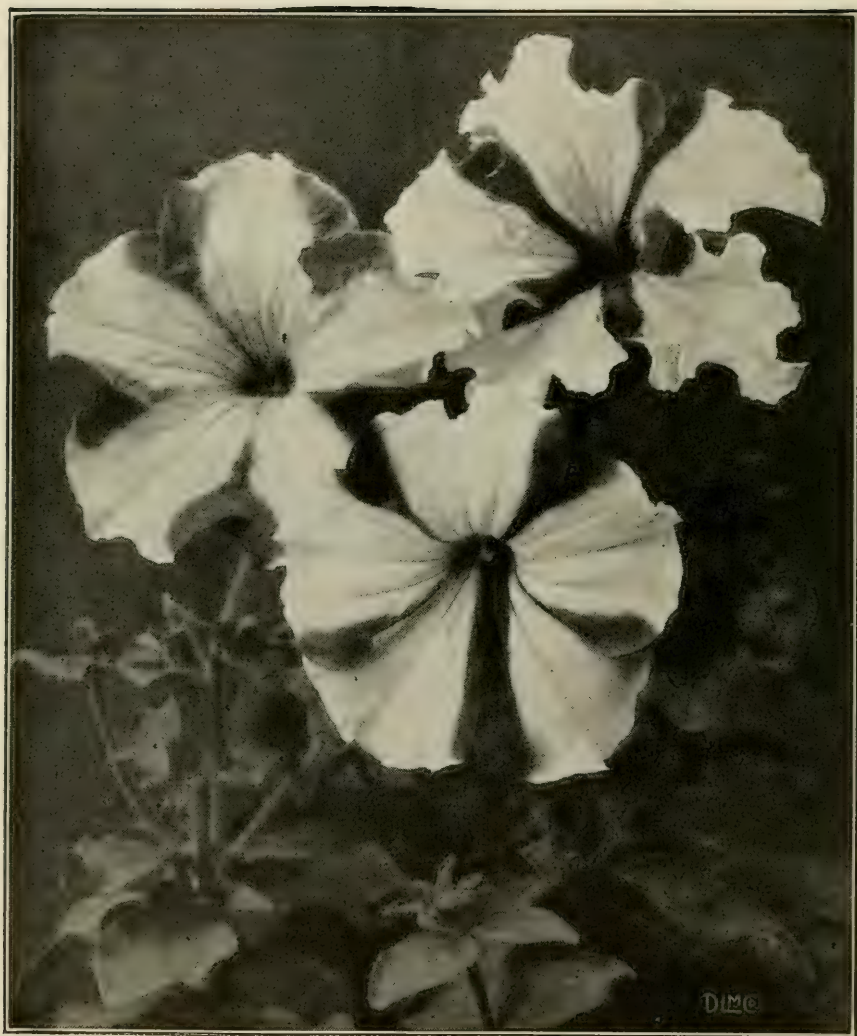
Propagation. Both are raised from seeds and by division.

LOBELIA. *L. Erinus* is a very popular bedding plant in Europe, but short-lived here, owing principally to the high temperature during mid-Summer.

Propagation. A few old plants kept on a bench along with such things as Heliotrope and Ageratum will give fine cuttings, which are rooted beginning of March and transferred to a hotbed, to make growth. The plants when grown from seed are not uniform in color or habit of growth.

MATTHIOLA (Stocks). The Ten-Weeks' Stock, *M. incana*, is a comparatively easy plant to manage. The varieties are numerous and there are strains obtainable with surprisingly few singles among a batch of plants.

Propagation and Culture. It is raised from seed at intervals from June to November. The seedlings should be put in small pots when of sufficient size and repotted into larger ones before planting in beds. Clean pots should be used, as the roots are then less liable



SINGLE PETUNIAS.—See page 233

to injury when the ball is removed. Twelve inches apart is a sufficient distance to plant. They will stand more neglect than most other plants. A sharp lookout should be kept for insects on the foliage. The soil should be rich and about 6 inches deep. They are at their best in a cool house with full exposure to the sun.

MESEMBRYANTHEMUM (Fig Marigold). *M. crystallinum* is the Ice Plant, and has glistening pustules upon its leaves resembling ice; besides this the plants bear small white or bluish flowers. *M. pomeridianum* and *M. pyropeum* are attractive flowering annuals. The pretty little variegated Ice Plant, known under the name of *M. cordifolium variegatum*, has a habit of damping off in the propagating bed when treated like the majority of bedding plants. A way to circumvent this is to prepare shallow boxes of sand and leaf soil. Give one good watering previous to putting in the cutting. Let the boxes stand for a few hours, put in the cuttings quite close together and stand them on a bench over the heating pipes. Give no more water till rooted; that is, if the soil does not become too dry; in this case the cuttings should not be watered with a sprinkler. This variety is one of the prettiest of dwarf bedding plants, and should be more commonly grown.

Propagation. The annual kinds should be sown indoors beginning of March. Cuttings of the perennial kinds should be rooted from cuttings in Autumn.

MIRABILIS (Marvel of Peru, or Four-o'Clock). *M. Jalapa* has tuberous roots, and in Winter may be stored in the same way as the roots of the Dahlia, or raised annually from seeds sown indoors. The flowers are very showy, of various colors, principally yellow, crimson, red and white.

NICOTIANA (Ornamental Tobacco). The Nicotianas are grown for their attractive and fragrant flowers. *N. alata (affinis)* and *N. Sanderae* are popular species, with pink or white salver-form flowers.

Propagation. The seed is very fine and is best sown indoors early in the Spring. Cover the pots with glass, but do not cover the seeds with soil.

NIEREMBERGIA (Cup Flower). *N. frutescens*, a blue sort, and *N. gracilis*, a white flowered species, are principally used in large vases, but they make exceedingly showy plants for the rock garden and border. *N. rivularis* is useful for dry banks, but is difficult to eradicate when it once gets a start.

Propagation. Seeds of these should be sown in September and plants wintered in a frame. The following Summer they will make much better subjects than from Spring-sown seed.

NIGELLA (Love-in-a-Mist). The *Nigella* bears a most attractive blue flower surrounded by lacy leaves. *N. damascena* is the species most cultivated.

Propagation. As soon as the weather permits seeds may be sown rather thinly where the plants are intended to bloom in the open border.

PANSIES (*Viola tricolor*). For Tufted Pansies see *Viola*, page 219.) To have Pansy plants ready to put out in the Fall the seed should be sown about the middle of August, and even earlier, where the weather will permit. In the very warm weather the principal danger is in the damping of the seedling plants shortly after they have germinated. Sow thinly and cover lightly with screened moss, or old manure, giving only enough water to keep the surface slightly moist. In the warmer parts of the country it will require good judgment in selecting a suitable place for the seed boxes during germination. One can be secured by raising some shaded sash above them, in a place where the air is not apt to get stagnant. As soon as the seedlings are large enough to handle, they should be pricked out in boxes of moderately moist soil, and for some time only given gentle sprinklings through a fine rose to prevent wilting. They are put in their Winter quarters by the beginning of October and given a mulching of rotted manure shortly afterward. In this way they can be grown in the same beds with low growing bulbous plants, such as *Crocus*, *Galanthus* or *Scillas*, these bulbs going out of flower just as the Pansies are coming in, securing a season of bloom from the time when the snow disappears until very warm weather, or, in Northern latitudes, all Summer long.

In some parts the plants make sufficient progress before the advent of cool weather, not only to bloom, but to send up numerous shoots from the base of the plant. This is a good opportunity to select cuttings of the finest forms to raise seed from. Take those cuttings having a small piece of solid stem; put in sand, treating them as cool as possible. As soon as rooted place in boxes of light soil and Winter in frames, planting out as soon as weather will permit. It should be borne in mind that plants put out in the Fall always give the best results in Spring.

Pansies to Flower in Frames. If sown early enough and potted off the seedlings will show the colors before planting and thus

enable the grower to select those which are best for selling. These should be planted in a frame facing south so that they will catch all of the sunshine available during the Winter months. If pinched back frequently it will induce the plants to make bushy growth before freezing weather; then mulch with leaf soil or old manure, giving air whenever the weather will allow. They will throw up an amazing quantity of bloom early in the season, which will pay to cut with the foliage attached so that good long stems can be secured. Pansy seed should be sown in very shallow boxes.

The plants delight in a low temperature and a soil which is open enough to enable the small, succulent roots to ramify freely through it. It is not necessary to have the soil largely of vegetable humus; one that answers well may be made up as follows: Screen some soil through a No. 8 sieve; the rough material which does not go through the meshes put through a No. 3 sieve. This, mixed with leaf soil, to one-third of its bulk, will insure a good germination. The idea is to keep the roots in a healthy growing state with abundance of air around the seed leaves to prevent damping off. Pansies do better outside during Winter than most people suppose. Planted early with a little mulching, and if the weather gets very severe, some old stable bedding thrown over them, will give all the protection necessary. For plants for Spring sales the seed may be sown late and wintered in coldframes, or it may be sown early in the Spring; but the most satisfactory plants are obtained from early sowing.

PAPAVER (Poppy). *P. Rhæas* is the popular Shirley Poppy with most dainty colors and petals the texture of silk. *P. somniferum* is the Opium Poppy, with large, single and double flowers; there are many named varieties which are giants in size and prolific of bloom.

Propagation. Sow seed very thinly; because the seed is so fine it is usually sown too thickly. Poppies are not readily transplanted.

PETUNIAS. Many persons call this the most reliable flowering annual. It is only advisable to sow the best strains of the double Petunia seed, as the majority of the seedlings will furnish all the single flowered plants necessary for ordinary use. The doubles can easily be picked out from the singles before the flowering period. They are known by their stocky appearance, the singles having a decidedly "annual" look shortly after the seedling stage has been passed.

Propagation. In order to prevent washing of the soil after the seed is sown, use boxes, say 3 inches deep; put a shallow layer of sphagnum in the bottom, make the soil firm, give a watering sufficient to wet the soil through; then when the surface will admit of the operation roughen it with the ends of the fingers. Sow the seed thinly and smooth the surface with the end of a cigar box without covering with soil. A pane of glass or a piece of damp cloth placed over the box will prevent a too rapid evaporation of the moisture till the seeds have germinated. They may be sown during the first part of February.

PHLOX. The annual sorts, *P. Drummondii*, of which there are numerous varieties, should be sown by the middle of February. The single whites and reds are most in demand.

Propagation. In sowing cover the seeds with sphagnum rubbed through a No. 4 sieve. In a moderate temperature they will germinate inside of a week. After the seedlings are large enough they should be pricked off into boxes from which they should be transferred to pots later in the season. When put in pots during the seedling stage they are apt to throw up flowering stems and become hard before sufficient growth has been formed. For late flowering plants a batch of seed may be sown beginning of May; these will be of most service if white varieties are selected.

PORTULACA (Rock Rose). In this genus we have *P. grandiflora*, a very desirable annual flowering plant, and in another species *P. oleracea*, one of the most bothersome weeds. *P. grandiflora* is a handsome plant in several colors for the rock garden, but in any situation it is never out of place.

Propagation. The seeds are very small, but the plantlets soon gain size. They very often spring up from self-sown seed. They delight in the hottest kind of weather.

RESEDA (Mignonette). *R. odorata* is the common Mignonette, one of the most fragrant plants grown. There are a number of improved flowered varieties, but the larger ones are often not so sweet.

Propagation and Culture. For early flowering, seed may be sown during the first half of August. The method of sowing the seed on the benches is the one there is the least difficulty with, and that calling for the least amount of intelligent care, as a number of seeds can be sown at each station where they are intended to flower, and the strongest plants left. This system is not always convenient, however. Other methods consist of sowing in pots and planting



MIGNONETTE

from them, or in boxes or pans, and pricked out from these into small pots, shifting if necessary, and planting out when the proper time arrives. Mignonette seedlings, when they get beyond a certain size, are exceedingly difficult to prick off successfully; but when taken as soon as they can be handled there is little danger of failure if ordinary precautions are taken against damping off, suffering from too much or too little water, or from the direct rays of the sun until the seedlings are established. Mignonette likes cool treatment, so that attempts to coddle it by giving a high, close atmosphere will not produce flowers worth the cutting, if they ever reach the flowering stage. The soil to grow it in should be well enriched with cow manure, and well firmed before either sowing or planting. About two quarts of soot to a barrel of water makes a good liquid manure. For blooming out of doors sow thinly as soon as weather permits.

RICINUS (Castor Bean). *R. communis* grows, according to variety, from 5 to 15 feet in height. *R. c. zanzibarensis*, a green-leaved form, continues growing all Summer and does not even ripen its seeds in this locality. *R. Gibsonii* has blood-red foliage.

Propagation. The seeds should be sown beginning of April in small pots, as they form a large mass of roots quickly after germinating.

SALPIGLOSSIS. Gorgeous colors and attractive flowers profusely borne commend *S. sinuata* to the garden lover. It is a glorified Petunia produced upright and with handsome veinings in the petalage.

Propagation. The seeds are minute and should be sown in boxes of well-prepared loose soil early in Spring for bedding, or in early Autumn for Winter blooming in greenhouse.

SCABIOSA (Pincushion Flower). The annual Scabiosa, *S. atropurpurea*, is grown widely for its charming head of beautifully colored flowers. It is useful for cutting because of its long stems and splendid keeping qualities.

Propagation. Sow the seed in the open ground in the Spring.

SCHIZANTHUS (Butterfly Flower. Poor Man's Orchid). These dainty, Orchid-like flowers deserve wide culture. For the private conservatory and partially shaded spot in the border they are most excellent. For the florist the plants or cut flowers are readily salable. There is a wide range of color combinations all of which are handsome. Two species are grown, *S. pinnatus* and *S. wise-*



RICINUS COMMUNIS—CASTOR OIL PLANT

tonensis. *S. wisetonensis* is thought to be a hybrid between *S. pinnatus* and *S. Grahamii* and is widely used as a pot plant because of its dwarfness and attractive pyramidal form. A white variety has proved very popular for cutting. (See page 240.)

Culture. The *Schizanthus* requires cool treatment throughout its whole existence. When given a temperature much over 45 degrees, night, the plants grow spindly. Keep the plants growing vigorously and do not let them become pot-bound, for they start to bloom so soon as their roots become too confined. Pinch back the young plants to make them bushy and flowery. By constant shifting and pinching huge plants may be flowered for Easter in 8-inch or 10-inch pots. They are great feeders and like a rich, rather heavy soil and should be supplied with applications of liquid manure and plenty of water. The *Schizanthus* requires frequent syringing to keep down red spider.

Propagation. The *Schizanthus* is an annual and can be easily raised from seed which is usually sown from September to November for Spring bloom.

SWEET PEAS. Without doubt, the Sweet Pea is the most popular annual out of doors. Everyone grows them, but many times with varying success. Sweet Peas should be planted on a well drained soil only, or one in which the excessive rains of Spring will not cause water to stand around the roots and start mildew. They do not like excessive shade, for the plants should make a sturdy growth. In the shade the growth is weak and spindly and but few flowers are produced. Place Peas, then, in the open, giving them all available light and air, although a little shade from midday suns of June and July is, of course, beneficial. Hot weather causes short stems on Peas and the best hay and grain weather makes an end of them.

The Preparation of the Soil is one of the most important points in the success of Sweet Peas. They like the cool soil and attempt to strike down deeply. Dig a trench two or three feet deep, break up and turn over the subsoil. Do not use it for top soil if it is poor. Put in a liberal amount of stable manure and work in a heavy dressing of bonemeal. This preparation should be made in the Fall and the bed left all Winter. When working over in the Spring give a good, liberal coating of well decayed manure or some fertilizer. If the soil is deficient in lime, dust the surface with fresh lime in Fall or Winter, using it as soon as slaked.

Sowing Seeds in Pots. In order to gain a month in season Sweet Peas may be sown in 3-inch pots in February and placed in a coldframe. But they are generally sown a month before wanted for outdoor planting and a smaller pot is used. Four seeds are sown in each pot. The frame used should be thoroughly cleaned and dusted with soot or lime. They can stand quite a lot of cold, but do not have them wet at the same time. Transplant outdoors when possible; this is usually about mid-April. Normally, the seed should be sown in open ground as early as March. As soon as the soil is warm enough the seeds will germinate.

Fall Sowing. For the Autumn sowing of Sweet Peas a piece of soil should be selected which will warm quickly in the Spring. Prepare it deeply, 2 to 3 feet, but use no manure. Make a trench 2 inches deep and sow the seed thickly and cover with loose soil. When the seedlings have germinated and freezing weather has begun, cover with 4 inches of coarse litter or straw, which must be removed in the early Spring after heavy frosts are past. The seed should be sown so that the shoots are just at surface of the soil when Winter freezes set in, say, late in October or early in November, according to latitude.

Summer Treatment. Give frequent cultivation and when the plants are nicely budded work bonemeal into the soil along the rows. If conditions are very hot and dry give the plants frequent syringings, which will keep down the red spider, and never allow aphids half a chance. Keep the plants free from green fly.

Staking. Many different methods are advised for training the vines. Perhaps no method is so successful as using brush or branch-lets. Stretching string from pole to pole is an easy way. Such cord can be easily removed when the Peas are through blooming. Chicken wire is rather useful, but has two objections: it must be cleaned each year, and it is thought to become heated a little too much, causing the Pea vines to dry prematurely.

TAGETES (Marigold). Three species are very common annuals with a pungent odor and brilliant golden yellow, lemon and maroon flowers. *T. erecta*, the African Marigold, is taller than *T. patula*, the French Marigold and the five-leaved and small-flowered *T. signata* var. *pumila*. They are of the very simplest culture, but good soil increases the size of the flowers.

Propagation. Seeds may be sown very early in the Spring.



SCHIZANTHUS—See page 236

TORENIA (Wishbone Flower). *T. Fournieri* is none too common yet as a half-hardy annual. Although it will germinate outside it takes too long a time in blooming. Owing to the color of the flowers (different shades of violet) it is desirable, as bedding plants of that color are not plentiful. *T. asiatica* and *T. flava* (*Baillonii*) are well suited for basket or vase work, as they are of a procumbent habit. *T. Fournieri* is of erect growth.

Propagation. Sow indoors middle of March and allow the seedlings to gain a considerable headway before potting.

TROPÆOLUM (Nasturtium). *T. majus* and dwarf forms and *T. Lobbianum* are well known and useful as climbers, or for planting in beds. All of them are quite tender, and should be put out rather late. With the exception of the double flowered forms which are perpetuated by cuttings, those varieties commonly grown are raised annually from seeds. The seed must not be sown too early, because they make rapid progress, and are apt to produce spindling growth in small pots.

VERBENA. The varieties of *V. hybrida* used to be kept true to name, the plants lifted in the Fall and cuttings taken in early Spring. Seeds can now be depended upon to furnish the finest flowering plants. *V. venosa*, an herbaceous species, with heads of purple flowers, is hardy in the Middle States. *V. erinoides* is a small-flowering sort of trailing habit useful for a hanging basket.

Propagation. Seed should be sown in February and the seedlings potted as soon as large enough. Pinching should be done early to make the plants branch and have them in bloom by planting-out time. *V. venosa* is rather bulbous rooted and may be divided in the early part of April.

ZINNIA (Youth and Old Age). The Zinnias are some of the most vigorous of all annuals; they are rather coarse, but the colors are handsome. *Z. elegans*, with its attractive, large flowering and crested forms, is very popular. *Z. Haageana* is a dwarf species of use for edging beds of the other sorts; the flowers of this species are shades of orange.

Propagation. Sow seed about the end of March and prick off into boxes of rather rich soil. Harden them off in a frame before planting out.

CHAPTER IX

Bulbous Plants

The term bulbous plants is generally applied indiscriminately to plants having thickened subterranean stems, such as *Crocus* and *Gladiolus*, including true bulbs, such as those of *Lilium*, *Hyacinthus* and *Allium*. A true bulb is simply a resting bud composed of leaf scales, as in *Lilium*, or partly formed by the bases of the leaves of the previous season's growth, as in the *Hyacinthus* and *Onion*. A corm differs from a bulb in having the interior part solid; examples, *Crocus* and *Gladiolus*. A tuber is a swollen underground stem provided with latent buds, as in the *Potato*. The thickened tuber-like roots of the *Dahlia* are simply reservoirs of nutriment, and are known as tubercles or tuberous roots. Terrestrial Orchids supply numerous other examples.

Outdoor Bulbs. Hyacinth and Tulip bulbs flowered out of doors may be made to last more than one season if the bulbs are given a little care. By the end of May, when the bulbs have to be lifted to make room for Summer plants, the foliage will indicate maturity by turning yellow. After lifting, the bulbs should not be allowed to lie around with the old leaves rotting over them. Spread them out on boards in an airy shed, so that they may have a chance to get plump and dry; after which they should be cleaned, stored and when the time arrives replanted for outdoor ornamentation. Low-growing hardy Spring bulbs, such as *Galanthus* (Snowdrop), *Crocus*, *Scilla præcox*, *Tecophilæa cyanocrocus*, *Triteleia uniflora*, *Puschkinia* and *Chionodoxa*, should be planted as soon as they are procured from the dealers. If put in late they bloom late and their foliage does not get time to ripen before the advent of real warm weather, and the bulb for the following season is next to useless. None of the latter is much used by florists for pot culture. In planting out they should, if possible, be given permanent positions. Sometimes Fall and Winter weather is favorable to premature growth of the tops, and because of this they should be protected from rapid thawing and freezing by a covering of an inch or two of half-decayed leaves or manure put on after freezing weather arrives.

Forcing Bulbs. Such bulbs as Tulips, Hyacinths (Roman) and Narcissus, are put in shallow boxes for forcing. The bulbs are inserted quite close together, if of the poorer grades; but if they are the largest sizes a little more room should be allowed for the development of the offsets. The soil used is generally old material from benches in which Roses or Carnations have been growing. In preparing bulbs for forcing the principal point to be borne in mind is that they must make roots before being put in heat. A place should be set apart for the boxes, where they may be covered with about 8 inches of sifted ashes. On the approach of freezing weather the ashes may be kept in a condition so that the boxes may be removed when wanted, by covering with rough stable litter; or, when grown in large quantities, a bulb house should be provided. In this structure light should be excluded and the roof thick enough to keep out frost. In a well-regulated house the bulbs remain in fine condition. They may be kept almost dormant for several weeks and be forced into bloom in less time than those from the open ground. Paper White Narcissus and Roman Hyacinths may easily be had in bloom in November, and Duc Van Thol Tulips by Christmas; but to insure these results early rooting must be looked after.

ACHIMENES. Greenhouse bulbous plants, much like Gloxinias. Grown for flower in Spring and early Summer.

Culture. Very easy. The usual method of cultivation is to start the rhizomes from the end of February till the end of April to give a succession of bloom. When the plants have made two inches of growth they are placed one by one in a wide, shallow pan about two inches apart each way, each growth being staked before plants show bloom. This method means a great amount of labor. It seems preferable to start the rhizomes in their last season's flowering pans; after making a little headway divide into three or more equal parts and put into their flowering pans without supports. The specimens are not so symmetrical as those which are staked, but they give a satisfactory quantity of bloom and are most useful for the conservatory during the Summer months. For growing in suspended baskets in the greenhouse the older kinds are well suited. Use wire baskets, and with started plants build them in from the bottom upward so that the sides will be clothed with them. The Achimenes do not need a very warm place for storage. During their resting season clip off the stems to within an inch or two of the pot instead of wrenching them out, as the rhizomes are easily torn out with them. Stand the receptacles on their sides in a dry part of a cold house. No water will be required till Spring.

Propagation. Rhizome cuttings placed in moist, warm house in Summer will root readily.

AGAPANTHUS. The African Blue Lily, or the Lily of the Nile, is a desirable plant for cool greenhouses, and ornamental either in or out of bloom. In general appearance *Agapanthus umbellatus* resembles the *Imantophyllum* but the flowers are bright blue, a great number of them being produced in an umbel supported by a long, stout stalk. The *Agapanthus* is one of those plants which have the appearance of doing well with cramped root room, so there is a temptation when potting other things to leave the plants for another year; but this practice is carried on at the expense of the magnificent heads of flowers, which get smaller and smaller until a season goes by without any being produced. This species stands the Winters south of Washington, D. C., in sheltered positions, and sometimes even in Washington when protected with leaves held down by evergreen boughs. There are several varieties—the white double-flowered and the variety with variegated leaves being the most conspicuous.

Culture. They flower in Summer, being kept dormant during Winter. Give plenty of water when blooming. They force well.

Propagation. Old plants are capable of being divided either when in leaf or in the dormant stage. When growing plants are pulled apart to be propagated the smaller pieces should get a chance to produce a few roots by placing in sand previous to repotting.

AMARYLLIS. The *Amaryllises* vary somewhat in their proper methods of culture so that it is necessary to know that some are rightly called *Amaryllis* while others should be known under the names of *Hippeastrum* (see p. 263,) *Crinum* (see p. 253,) *Nerine*, *Sprekelia*, and *Zephyranthes* (see p. 277.) *Amaryllis Belladonna* is the true *Belladonna* Lily. The commonest form is pink, but there are purplish and white varieties. The Lily flowers are borne in clusters of eight or ten upon long stems and appear before the leaves. It really grows wild in the Cape of Good Hope and in some parts of Italy. It is nearly hardy in the northern United States and planted outdoors succeeds best only where it may remain in the open ground throughout the year.

Culture in Coldframes. They may be grown very nicely in frames. The bulbs should be planted when at rest, which is in Spring and early Summer, and the flowers will appear in August or early in September, the flower-spike preceding the leaves. After flower-



HIPPEASTRUM (AMARYLLIS)—See page 263

ing, leaf growth should be encouraged as much as possible, as upon this the next season's flowers will depend. Plant the bulbs in the frame 8 inches apart each way; the soil best suited to them is a sandy one, made very rich with manure that has long laid in the compost heap, so there is no heat or fermentation in it. Nothing further need be done, as the frame will not be covered until the flowering is over. Rapid growth immediately follows the flowering, and should there be an appearance of frost before the leaves die down, the sash should be put on, the same as over a hotbed, removing when the weather will permit. Upon the approach of Winter fill the frame, which should be about 6 inches above the soil, with leaves, put on the sash and let them remain undisturbed until Spring. It is a good plan to leave a slight covering of leaves over the bulbs until they flower, which will keep the soil moist and cool. It does not matter if all the leaves are left over the bulbs until the first of August, as the frame must be wholly devoted to this bulb. Once planted the bed should be allowed to remain undisturbed for several years.

Pot Culture. Bulbs may also be planted in 7-inch pots, in which case they are treated the same as for frame culture. In the Spring the plants should be allowed to gradually become dry.

AMORPHOPHALLUS (Black Calla). Useful for sub-tropical bedding, owing to their very handsome leaves; those of *A. Rivieri*, the species commonly met with in cultivation, being between 4 and 5 feet across. The petioles are necessarily stout and beautifully marbled with creamy white. The leaves are very much divided. In early Spring the flowers are produced before the leaves; they have such an offensive odor that unless seeds are wanted they should be cut off before developing. The large tubers are wintered in a manner similar to those of the fancy-leaved Caladiums.

Propagation. Offsets of the parent tubers are taken at time of potting. Seeds may be sown.

ANEMONE (Windflower). The tuberous rooted species known as *A. coronaria*, *A. fulgens* and *A. hortensis* are all natives of Southern Europe.

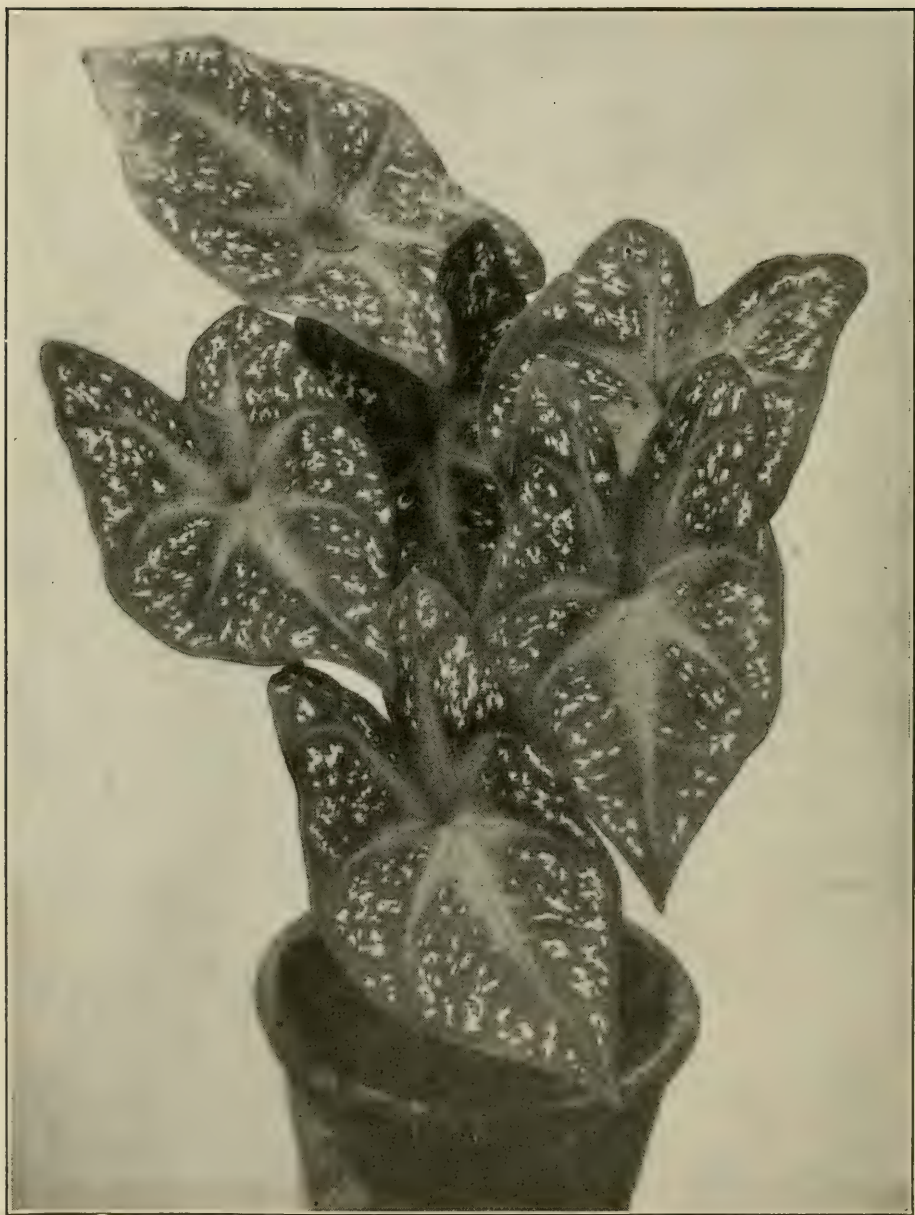
Culture. When planted permanently the soil should be open and well drained, and if it is apt to bake in Spring give a top dressing of leaf soil or stable manure thoroughly rotted. This will keep the surface soft and enable the growths to break through easily. The above species are sometimes grown in pots; they may be planted in September or October, kept in a coldframe and flowered in Spring.

A. coronaria and *A. fulgens* are the most useful for this purpose. The many varieties are sold cheaply by dealers in bulbs.

Propagation. By the division of roots in the early Spring before growth starts, or by seeds in Fall or Spring.

CALADIUM, FANCY LEAVED. There are several species and a great many forms of these gaudy foliage plants. They are principally used to fill the benches of the conservatory during the Summer months, when most of the usual greenhouse plants are occupying their Summer quarters out of doors. They are also used in bedding, and if the higher colored forms are avoided, choosing those in which green and red predominate in the leaves, they will succeed well even in the full sun. A goodly quantity of bonemeal worked into the soil before planting will make strong and well-colored leaves. The small-leaved kind called *C. argyriles* will be all the more useful if not started too early, as it is most needed late in the year. It keeps well among sawdust in paper bags. The tubers are so small that several hundred can be put in a small bag. *Caladium odoratum* or *Colocasia odorata* is used much in the same manner for outdoor decoration in Summer as the well-known Dasheen or Elephant Ear, *Colocasia esculenta*. They are known from each other by *C. odorata* having thick, fleshy stems above ground and the leaves pointing upward, or at least growing with the leaf blade horizontal, while *C. esculenta* has drooping leaf blades, and has no stem above ground. They are both wintered in the same way, that is, in a dormant condition, in a warm place, although *C. odorata* can easily be kept over Winter with the roots of the previous Summer preserved and the foliage green by storing the stems thickly together in boxes, keeping on the youngest leaves when lifted and storing plants in a fairly warm house, giving water occasionally. Well furnished plants can be had quicker from the stems of this than from those of *C. esculenta*.

Starting Tubers. The first lot of tubers should be started about the middle of February for conservatory decoration. They should first be gone over carefully, and any that show signs of rotting at the bottoms should have the decayed part cut or scraped off and dusted with powdered charcoal. The under part of a *Caladium* tuber, after it has reached a certain size, is more or less in a state of decay, but sometimes, through being kept too wet, too dry, or in a place which is too cold, this natural decay is hastened by rot, which, if not checked, will kill the tuber in a short time. The white,



CALADIUM "HER MAJESTY"

succulent roots start from the top part or neck of the tuber, near the base of the leaf-bud, so this part must be covered and kept in an evenly moist state to start them into growth. The best conditions under which to start growth are as follows: Take a box 3 inches deep, put half an inch of moss in the bottom; put in the bulbs close enough together so that at least half the space will be occupied, then cover with moss to the top of the box. Have the moss chopped so that the particles will fall easily from the roots previous to potting. This operation may best be done when the roots are from 1 to 2 inches long. A good soil should consist largely of leafmold. As the tubers send out their roots shortly after putting in the moss they should be transferred to pots before the roots get too long, else they will be injured in the operation. Pots should not be used of a size larger than will hold the tubers and roots comfortably, without danger of being bruised. The subsequent shifts should have a greater quantity of loam with rotted cow manure added. For specimen plants do not cut up the tubers, plant them whole. At the end of the season, as a rule, they will have made quite as many easily detached tubers as if they had been cut up in the Spring.

Preparations for Lifting Tubers. By the beginning of October, and earlier in some localities, fancy leaved *Caladiums* will soon begin to lose their bright colors, owing to the low temperature. Before this occurs go over them and renew the names, using fresh labels. If they are without names go over them all the same, jotting down the colors of the leaves, and whether certain kinds should be used again. All this is very necessary with the *Caladium* as it is a useful bedding plant. It is difficult to decide whether it is best to plant them in the dormant state like *Gladioli*, or to start indoors before planting. The latter method is often favored, mainly because there was something to look at as soon as planted. Splendid growth is made from dormant tubers at planting time, and this speaks volumes in favor of this method. It certainly saves the time given to the starting and potting indoors. But again, more money can be got out of a plant, with its beautiful leaves, started in a 5-inch pot than can be got for a mere tuber that has no more beauty to it than a Potato.

Storing the Tubers. Outdoor plants as they lose their leaves should be dug up and laid under the bench of a house where the sun won't get at them. Give water occasionally to both roots and foliage until the latter gradually decays. After the leaves are cut off and the tubers are dry, put as many as will go into a fair-sized

pot, then run in dry sand and stand the pots in the warmest part of the house, where they will be free from drip. They should be kept in a temperature not lower than 60 degrees during the Winter. Plants in pots will soon begin to look badly unless they be kept in a warm, close house. To rest them, withhold water gradually, and when the leaves are nearly gone, remove the pots to the driest and warmest part of the house, placing the pots on their sides. If room cannot be spared the plants may be knocked out of the pots and stored like the outdoor collection.

Propagation. Many of the kinds form small tubers on the sides of the large ones; these are easily detached and grown on. Again, many sorts, especially some of the finer and recently introduced varieties, do not make these small tubers, or not in large enough numbers to be of much service; but it will usually be found that the large tubers have one or more eyes generally at the sides. These, if taken off with a piece of the tuber attached, either before or after starting, will make small plants the same season. In separating from the parent tubers dust the cut surfaces with powdered charcoal, to prevent decay. If taken off before the tubers are started, put the pieces in warm sand to hasten the formation of roots. The propagation of *C. odorata* should be attended to during February. Cut up the long stems into pieces with a dormant eye to each piece, dust them over with powdered charcoal to prevent decay, and lay them in the sun to dry for a day or so; afterward put in moss not too wet, in a warm frame, where they will sprout much in the same manner as stove Alocasias. Pot as soon as the roots are sufficient in number.

CANNAS. These handsome subjects mark a wonderful development by the plant breeder. At first the Cannas were only prized as foliage plants; the petals were narrow and the flower was very unattractive. Now we have an excellent series of wonderful Cannas with superbly colored gigantic flowers, all of which are of easy culture and great value for the garden, where they are planted in formal beds or mixed in the perennial border. The beginning was made in Europe, and from the first of the improved forms numerous fine varieties have been raised in America, so that now anyone can take a few good flowered sorts, pollinate the flowers, and among the resulting progeny will be found some as good, if not better than the parents. A new race has recently sprung up known as the Orchid-flowered Cannas; these have been secured by crossing the Crozy section with the large, yellow-flowered *C. flaccida*. The

flowers are very large and showy, but the direct cross between the two is not very suitable as a bedder, owing to the soft nature of the segments. There are at present indications of the orchid-flowered section being considerably improved in the substance of the flower so that in a few years they will be more largely grown. Some of the varieties are grown for the foliage alone; these are either slightly variegated or with the leaves dark red. Black Beauty, raised by Mr. E. M. Byrnes, U. S. Dept. of Agriculture, has for 25 years been by far the best of this class, and likely to remain so. It should never be planted out in a dormant state.

Culture. The first lot of rhizomes intended for bedding purposes should be started during the first part of February. These should be the finest kinds and those which it is desired to increase, because even the smallest pieces having one dormant point, started early, will make plants large enough to occupy 5-inch pots by the time for planting out. Leave as much of the rhizome to each point as possible, as it will send out new growths from the dormant buds between the scales. In the formation of the rhizomes scales are first formed entirely encircling the rhizome, which, as it reaches the light, gradually elongate until true leaves are formed. The main crop may be gone over during the first half of March. Cut up the rhizomes into pieces small enough, so that when the time comes for potting, each piece will fill a 5-inch pot. Before potting they should be put in material which will encourage the formation of roots, and the best for this purpose is sphagnum, sand and rotted cow manure in equal parts. When the rhizomes are potted without roots they always turn out unsatisfactory. Some start immediately but the majority remain dormant, and take up valuable space for too long a time. Use boxes to start the rhizomes; place a couple of inches of the material in the bottom, put the pieces on this and cover with at least 1 inch of the rooting medium. Water only sparingly at first; as the growths push up, give full exposure to the light.

Storing. Cannas should be lifted from their Summer quarters just as soon as the foliage is blackened by the first frosts. Before this occurs they should be gone over and labeled correctly, noting the color, size and comparative value of seedlings. Use hanging labels, tying them on firmly as near the ground as possible. Cut off the flowering stem about 6 inches from the ground. If there be greenhouse accommodation, a position under the benches, where they won't get much drip, will suit them exactly. If greenhouse accommodation is not available they should be closely packed

together in boxes, using dry sand, and stored away where frost will not affect the rhizomes.

Raising from Seed. The seed covering is very hard and resists the influence of heat and moisture for a long time under ordinary conditions. Germination may be hastened by soaking the seeds in warm water, and also by removing a very small piece of the seed covering with a file. In any case sow early and in a bottom heat of from 75 to 80 degrees.

CHIONODOXA (Glory of the Snow). Several species are common, namely, *C. Luciliæ*, light blue with white center, and *C. sardensis*, dark blue. The Chionodoxas are very closely allied to the Scillas and might easily be confused with them. They are early flowering, March or April, and are very effective when planted in huge clumps in the border. For a small bulb they may be planted quite deeply—perhaps 4 to 5 inches is not too deep. They should be replanted every third year, else they run out.

CLIVIA (Imantophyllum). *C. miniata* and its forms are the finest. An indispensable plant for private collections; grows best in a cool greenhouse.

Culture. Large plants need shifting only at long intervals, and for this reason the soil should have a good sprinkling of crushed bone and charcoal.

Propagation. Increased by division of old plants which have become crowded in their pots.

CONVALLARIA (Lily of the Valley). Pips of *Convallaria majalis* used in this country for forcing purposes are obtained from abroad. There is, however, no reason why they should not be produced as good in the United States. Lily of the Valley thrives in some parts very luxuriantly, when grown in the shade of small trees with an annual top dressing of decayed leaves or old manure. The pips are received during the early part of November, at which time good roots are obtainable from the previous year's supply, kept in cold storage. Or home grown material may, in time, be used, as then preparation could be made earlier with greater certainty of success in early blooming.

Lily of the Valley is a decidedly artificial looking flower when unaccompanied by its foliage. A stock of small pips should be put in the forcing house and given plenty time to develop the foliage for occasions when wanted. The material in which to place the pips may be pure sand, as no new roots are made during the forcing period. When taken from a temperature near the freezing point.

increase it very gradually until a bottom heat of from 80 to 85 degrees is given for the actual work of forcing. The pips may be kept almost in the dark at first, gradually giving light as they develop; but keep them shaded from the sun. In storing pips for the Winter keep them in a frame, with a northern exposure, so that rapid thawing and freezing may be prevented. There are double flowered and variegated leaved forms; all of them are desirable for half-shaded places in the open border.

CRINUM. The tender species are not much grown indoors, but there are several which are useful for the hardy border. One which gives much satisfaction and which is perfectly hardy, is named *C. longifolium*. The flowers are tinged with rose. There is a white-flowered form. *C. Powellii* is a hybrid between *C. longifolium* and *C. Moorei*. It thrives in Washington with slight protection in Winter. *C. Moorei* is also hardy when planted in warm soils and slightly protected. In large conservatories *C. giganteum* should be grown if only for the foliage. The leaves are several feet in length, fully 6 inches broad in adult specimens, and of a bright green color. The flowers are pure white and sweet smelling, produced at irregular intervals.

Propagation. Nearly every flower will set seeds which are very large and irregular in shape. They should be sown as soon as ripe, as after falling to the ground a little moisture will cause them to germinate in a few days. Sow the seeds 2 inches apart in a seed pan; keep in a frame, and plant out without potting off in Spring.

CROCUS. The species commonly grown are *C. vernus* and *C. Susianus*, the latter being the early, small yellow sort. The Crocus is as universally admired as any bulbous plant because it can be planted in great profusion without much expense. The varieties are so bright and cheerful that they are excellent planted either in lawns, in the herbaceous border or under trees. Especially attractive are bold clumps of one variety near evergreens when they are branched to the soil. Crocuses must be planted in an open place in order to have them flower. New bulbs are produced above the old ones each year and the plant becomes higher and higher in the soil; they should thus be transplanted every third year.

DAHLIA. The Dahlia is a favorite in the gardens of those who can grow them. Near Mexico City they are growing wild upon the sides of the cool ravines in the partial shade. It is hot during the day but at night it becomes cool. Their natural habitat thus furnishes an index to their proper culture.

The classification of Dahlias approved by the American Dahlia Society is of interest.

1. CACTUS DAHLIAS

A. TRUE FLUTED TYPE: Flowers fully double; floral rays (petals) long, narrow, incurved or twisted, with sharp, divided or fluted points and with revolute (rolled back) margins, forming, in the outer florets, a more or less perfect tube for more than half the length of the ray.

Typical examples: Snowdon, T. G. Baker, Mrs. Douglas Fleming, J. H. Jackson, H. H. Thomas and Rev. T. W. Jamieson.

B. HYBRID CACTUS OR SEMI-CACTUS TYPE: Flowers fully double; floral rays (petals) short as compared with previous type, broad, flat, recurved or twisted, not sharply pointed except when tips are divided (staghorn), margins only slightly revolute (rolled back), and tubes of outer florets, if any, less than half the length of the ray.

Typical examples: Master Carl, Perle de Lyon, Flora, Mrs. J. T. Mace, Kalif and Rheinkoenig.

2. DECORATIVE DAHLIAS

Double flowers, full to center in early season, flat rather than ball-shaped, with broad, flat, somewhat loosely arranged floral rays (petals) with broad points or rounded tips which are straight or decurved (turned down or back), not incurved, and with margins revolute (rolled back), if rolled at all.

Includes forms like those of Souvenir de Gustave Douzon, Jeanne Charmet, Le Grand Manitou, Delice, Lyndhurst and Bertha Von Suttner, but *does not* include Le Colosse, Mrs. Roosevelt, Dreer's White, Grand Duke Alexis or similar forms, which fall into section B. of the ball-shaped double Dahlias.

3. BALL-SHAPED DOUBLE DAHLIAS

A. SHOW TYPE: Double flowers, globular or ball-shaped rather than broad or flat, full to center, showing regular spiral arrangement of florets; floral rays more or less quilled or with markedly involute (rolled in) margins and rounded tips.

(The class called Fancy Dahlias is not recognized separately in this classification, but is included in this sub-section A.)

Typical examples of Show Dahlias: Arabella, Dorothy Peacock, Gold Medal, John Walker, Colonist and A. D. Livoni.

B. HYBRID SHOW, GIANT SHOW OR COLOSSAL TYPE: Flowers fully double, broadly hemispherical to flatly globular in form, loosely

built so spiral arrangement of florets is not immediately evident; floral rays (petals) broad, heavy, cupped or quilled, with rounded tips and involute (rolled in or forward) margins.

Typical examples: Grand Duke Alexis, Cuban Giant, Mrs. Roosevelt, Le Colosse, W. W. Rawson and Golden West.

C. POMPON TYPE: Shape and color may be same as of A. or B.; but must be under 2 inches in diameter.

Typical examples: Fairy Queen, Belle of Springfield, Darkest of All, Nerissa, Little Herman and Snowclad.

4. PEONY-FLOWERED OR "ART" DAHLIAS

Semi-double flowers with open center, the inner floral rays (petals) being usually curled or twisted, the other or outer petals being either flat or more or less irregular.

Typical examples: Queen Wilhelmina, Geisha, Hampton Court, Mrs. W. Kerr, P. W. Janssen, and Glory of Baarn.

5. DUPLEX DAHLIAS

Semi-double flowers, with center always exposed on opening of bud, with petals in more than one row, more than 12, long and flat, or broad and rounded, not noticeably twisted or curled. (Many so-called Peony-flowered Dahlias belong here).

Typical examples: Big Chief, Souv. de Franz Listz, Merry Widow, Sensation, Prairie Fire and Hortulanus Budde.

6. SINGLE DAHLIAS

Open-centered flowers, small to very large, with eight to twelve floral rays (petals) more or less in one circle, margins often recurved (turned down or back). There are no distinctions as to colors. The type embraces the large Twentieth Century as well as the smaller English varieties.

Typical examples: White Century, Golden Century, Scarlet Century, Newport Marvel (of the large-flowered forms); Polly Eccles, Leslie Seale, Danish Cross and Ami Barillet (of the lesser flowered forms).

The Star singles and Cactus singles are omitted from the present classification scheme as not being sufficiently numerous or well defined yet.

7. COLLARETTE DAHLIAS

Open-centered blossoms with not more than nine floral rays (petals), with one or more smaller rays, usually of a different color, from heart of each ray floret, making a collar about the disk.

Typical examples: Maurice Rivoire, Souvenir de Chabanne, Diadem, Orphee, Madame Poirier and Albert Maumene.

8. ANEMONE-FLOWERED DAHLIAS

Flowers with one row of large floral rays (petals) like single Dahlias, but with each disk flower producing small, tubular petals.

Includes such forms as those of Graziella, Mme. Chas. Molin, Claude Barnard and Mme. Pierre Dupont.

9. OTHER SECTIONS

MINIATURE OR POMPON CACTUS: Small-flowered, stellate, fine-petaled Cactus Dahlias represented by Tomtit, Mary, Nora, Minima. **MIGNON OR TOM THUMB:** Dwarf, bushy, single flowered Dahlias for edging. *Typical example:* Jules Closson. **BEDDING DAHLIAS:** A taller, more upright type than the Tom Thumb. *Typical examples:* Barlow's Bedder and Midget Improved. **COCKADE OR ZONAL DAHLIAS:** Single or collarette Dahlias, with three distinct bands of color about center. Type hardly known in America, but includes forms such as those of Cockade Espagnole.

Culture and Propagation. The soil should be very rich and light, and if the plants are put in positions where it is inconvenient to water them during dry weather they should get a mulching of half-decayed stable bedding. Although the kinds are perpetuated by division, grafting and cuttings, the latter method is the one best suited for raising large quantities of young plants. The roots are brought into heat about the 1st of March, covered over with some light soil, and encouraged to make growth by frequent syringing. As soon as the shoots are 3 or 4 inches long, separate from the parent, taking them with a heel. They can then either be put singly in small pots and kept close and warm until rooted, or put in an ordinary propagating bed with a bottom heat of 75 degrees. The sand need not be kept very moist, but the atmosphere should contain enough moisture to prevent wilting. As soon as weather permits the plants should be put out in a frame to harden.

They may be planted into the open ground when the frosts are safely past and the soil has warmed. There is nothing gained by planting in a cold, water soaked soil. The larger growing sorts are best planted 4x4 feet and the tubers are set about 4 inches deep. Some support should be supplied the plants in their early stages of growth. Each tuber makes several growths which may be allowed to grow until several leaves have formed, after which the

strongest one or two are selected. Tie this shoot to a stake immediately and continue to support the plant as it develops.

Storage. When the Autumn killing frosts arrive, perhaps in October, and the foliage is killed, take up the plants and allow them to dry a little in the sun. Cut off the old stems so that a stub of 3 inches is left. Then place them in a cellar where temperature will surely remain above freezing, about 40 to 45 degrees Fahrenheit. They may best be placed with the stems down on shelves and covered with soil or sand. With large tubers it will be unnecessary to cover them; merely place them in a heap on shelf or floor, keeping the stems to outside. Do not let them get dried out; if they shrivel, sprinkle a little water over them. If kept too moist they soon mildew.

ERANTHIS (Winter Aconite). Among the first plants to open their flowers in the hardy plant border is *E. hyemalis*. It should have a place to itself, or the space in which it is growing can be covered after the foliage is gone with annuals, of different varieties.

Propagation. It is propagated readily from self-sown seeds and by dividing old clumps in mid-Summer.

EREMURUS (The King's Spear). This is a very stately subject for the garden. Two species, *E. robustus* and *E. himalaicus*, and many varieties are grown. The spikes are frequently 6 to 8 feet tall and are covered with white, pink or yellowish flowers, which continue to open for nearly a month. For some reason they are difficult to grow. Certain of the plants rapidly multiply and bloom, while others die out entirely. The bulbs should be planted rather shallow, in a fairly rich but very well drained soil. These plants are native to desert spots of Western and Central Asia. The matter of Winter protection is important, for the plants should be covered with leaves and left till late in the Spring, else the young shoots will be injured by the cold. The roots are fleshy and spread out in several directions. Plant as soon as received in November.

ERYTHRONIUM (Dog-tooth Violet. Adder's Tongue). These showy Spring flowers are found wild in the Eastern states. There are at least fifteen species, the ones most commonly cultivated being *E. americanum*, the species found abundantly in the East, *E. grandiflorum*, *E. californicum*, *E. revolutum* and *E. Howellii*. As Spring flowers for naturalizing they are largely used. Most of the species are offered by European firms. The Western species are cultivated and offered for sale by dealers in California.

Propagation. There is no necessity for propagating them in the East, owing to the low rates charged by dealers. They are among the first flowers to open in Spring.

EUCHARIS. The Amazon Lilies have long been popular stove bulbous plants, their large, pure white flowers making them favorites wherever grown. To the florist who does a general trade this is a paying plant when properly grown in moderately large quantities. There are three species in general cultivation—*E. grandiflora* (*amazonica*), *E. candida* and *E. Sanderi*. The first is the best known of the three, and the most profitable to grow, as the individual flowers are larger and more of them are produced on a stalk. They are grown in pots, tubs, or on benches.

Culture. Their culture seems a trifle difficult to many, but this idea has arisen through trying to grow them under adverse conditions. They are plants which delight in a warm, moist atmosphere, shaded from strong sunshine. The temperature should never fall below 60 degrees, and it should only be allowed to get in the neighborhood of that figure during cold weather. The plants cannot be properly grown after the manner of most bulbous subjects which florists handle, such as Liliiums, Richardias, Gladioli and Tulips; that is, potting them up at a certain time to have them in bloom at a given date. Their culture has not been brought down to such a fine point because their nature does not permit of it. They can be grown either with or without a short period of rest in the Fall months. It is best to keep them growing all the time, but to do this successfully the roots must have close attention. From the nature of the compost in which they grow it will become sodden if extra precautions are not taken in the way of providing good drainage, also in mixing with the soil a goodly quantity of broken charcoal to keep the mass porous. The principal ingredients should consist of loam two parts, leafmold one, a fourth to consist of rough sand and well rotted cow manure. The first two methods are preferred, as the plants can be more easily handled than when on benches. A good sized clump can be kept in a 10- or 12-inch pot for a good many years by periodical examinations of the drainage, the decomposed soil removed from around the ball with the aid of the hose, and a mixture of loam and bonemeal dusted over it. Put back in the pot and give a good top dressing. Clumps treated in this way have flowered three and four times in a year regularly for twelve years.

FREESIA. The rapid improvement of this old favorite indoor flowering bulb has placed upon the market not only pure white forms

but beautifully colored sorts as well. *F. refracta* is the type and from this have been developed such varieties as Purity by R. Fischer, a pure white sort. The colored sorts, known as the Rainbow strain, are rather expensive as yet for extensive planting, but they are worthy of wider use. Freesias which are wanted to bloom by the end of the year should be potted or boxed as soon as they can be procured from the dealers. Plunge the pots in ashes, in a frame, where strong sunshine won't keep the surface of the soil too warm and dry. They must not be covered over as other bulbs are after potting, as the leaves are thin and tender and must develop to a considerable extent before the flower stems make their appearance. Save the larger bulbs after flowering and they will be as good as any which can be purchased.

FRITILLARIA. *F. imperialis*, the Crown Imperial, is an old favorite not much planted at present. It is so stately that this is extremely strange. In the Spring, when the bulbs start into growth, the stem elongates very rapidly until finally it is surmounted by a crown of flowing bells and a tuft of leaves. They are very interesting as seen in the distance, but even more so when examined carefully close at hand. The bulb seems very susceptible to any sort of injury and should not be kept out of the soil for any length of time. They should be planted about 4 or 5 inches deep and on their sides, because they often decay easily. The bulbs should be set on several inches of sand. They enjoy a rather rich soil and when once established grow very easily. If the flower stem is a trifle weak give a little staking of some sort. Single and double, orange, scarlet and yellow varieties can be had. One fact, before leaving the Crown Imperials: They are often called Skunk Lilies. The reason is easily guessed if one inhales the odor of the flowers or bulbs. This is hardly objectionable, however, if one does not get too close to the plants. *F. meleagris*, the Guinea-hen Flower, is also well-known and is fine for naturalizing in the grass or for a mass in the perennial border, as it flowers in May.

Propagation. Seed may be sown as soon as ripe although the bulbs increase naturally.

GALANTHUS (Snowdrop). The Snowdrops are better known in all the northern countries of Europe than in the United States. There is a great difference in the flowering period of the different species. Some of the large-flowered kinds, especially those from Asia Minor, such as *G. Elwesii*, open their flowers in Washington during the latter part of January. A peculiarity which is rather

strange is that when the flowers are fully open, although zero weather be experienced later on, it has no bad effect on the flowers; they are usually prostrate during the cold spell, but they lift up their heads after it has passed and even bear seeds. This happens frequently before the common *G. nivalis* has pushed through the soil. We ought to see more of these harbingers of Spring, especially in our public parks.

GALTONIA (Summer Hyacinth). *G. candicans* is a bold, stately, bulbous plant which is very admirably used in the back line of a border. The tall spikes of inverted white bells give a very pleasing effect, and seem to contrast most exquisitely with many of medium, tall growing perennials, such as *Monarda* and *Coreopsis*, or with annuals such as *Bachelor's Buttons* and *Snapdragons*. The bulbs are not strictly hardy and must be dug each Autumn and planted the following Spring. Placing the bulbs about 5 inches deep serves to give the tall stems the proper support. After blooming one year the bulbs frequently rest a year before blooming again. It is advisable to buy a new stock each year.

Propagation. They are easily grown from seed.

GLADIOLUS (Sword Lily). The modern *Gladiolus* is a regal flower stately enough for the finest mansion, as well as a democratic flower charming enough for the home garden and cottage window. Each year finds new uses for the *Gladiolus*, which now holds first place among the Summer blooming bulbs. First, because of the great range of color; secondly, because of wonderful keeping qualities, each spike keeping over a week; thirdly, because of its easy cultivation, primarily the same as that for *Potatoes*; and, fourthly, by the proper choice of established varieties they can be commended because of their cheapness. This flower is extensively utilized for all kinds of decorative work. Large vases or baskets of the stately flower spikes fill a place quite distinct from any other flower. As a garden subject the *Gladiolus* is unexcelled for furnishing a long season of bloom, extending from mid-July until frost, either in a bed, in which case the plants should be very close, or in clumps in the herbaceous border.

The best soil for the *Gladiolus* is a medium loam. It appreciates good fertility, but seems sensitive to any manure in contact with the bulbs. Manure is good if applied in the Autumn previous to planting. The best fertilizer for general use is one that would be called a *Potato fertilizer*, rich in potash and phosphoric acid, both chemicals being useful in the proper formation of good bulbs. Bone-



GLADIOLUS

meal is also extensively used. Liquid manure, when the buds are forming, seems beneficial.

Gladioli are not hardy, except some varieties of *G. Lemoinei*, and even these require protection in New York State. Planting should be deferred until all danger of frost is past. A well planned succession in planting is advisable. The depth to plant is determined by the character of the soil. In the lightest soil 7 or 8 inches is not too deep, but in a heavy clay 4 or 5 inches would be a sufficient depth. There are two reasons why the corms should be planted as deep as the character of the soil will permit: First, the *Gladiolus* is moisture-loving, and in deep planting its roots are in the cooler moist soil; secondly, the soil acts as a support, no other support for the stems being necessary ordinarily. Commercially, the corms, *i.e.*, bulbs, are usually planted in rows, often two rows, about 6 inches apart, in the furrow. If the corms are over 1 inch in diameter they are scattered promiscuously.

Upon the approach of frost the corms are dug, and the tops left on the corms. They are then stored in an airy place to dry thoroughly. After several weeks the last year's exhausted corms and the old stems may be removed and the stock cleaned. The best storage temperature is from 40 to 45 degrees and in a rather dry atmosphere. If the corms become heated they dry, and this causes them to start prematurely. If too humid the corms rot or start growth. A shallow tray 3 or 4 inches deep insures the corms against heating.

Propagation. By seed new varieties are obtained. There is also a natural increase due to the formation of new corms above the old ones as well as the production of small cormels, or spawn, produced above the old corm and below the new one. The last two methods propagate the varieties true to name.

GLORIOSA. The Gloriosas, especially *G. superba* and *G. Plantii*, are ornamental flowered liliaceous plants, very suitable for our hot Summers. The plants have a vine like growth and must be supported by sticks. They are serviceable for the embellishment of greenhouses during Summer. In the District of Columbia they do well out of doors.

Propagation. To raise bulbs sow a few seeds in a 6-inch pot and allow them to remain in their seed pots for the Summer, gradually drying off as the foliage turns yellow. Store with *Gloxinias* during the Winter. Each plant may be potted off singly the following Spring.

HIPPEASTRUM. Many of these are known as Amarylli. The flowers are scarlet, crimson and white, many varieties being striped and mottled. (See illustration page 245.) These plants are not as much grown as their merits deserve; this is partly because the finer kinds are somewhat expensive, especially when flowering bulbs are purchased. With a few good sorts to start with they may be increased, and even new varieties raised much more rapidly in America than in Europe, as our Summers are very favorable to their rapid growth and increase by offsets. Most of the very numerous hybrids now in cultivation are the progeny of *H. vittatum* and *H. Ackermanni*. There are two methods of culture—growing in pots all the year round, and growing them during Summer planted out in the open, lifting and potting in the Fall. The first method is preferable for the production of the largest sized blooms. Their season of blooming is generally from January to May.

About the beginning of the year the pot grown bulbs which are dormant should be removed from the pots and repotted in a size larger pot using good, rich compost; at first water only to settle the soil, gradually increasing the supply. Unless a trifle pot bound the bulbs do not bloom so well. Some bulbs will show flowers early; these, if wanted in bloom quickly, will be forced along with a minimum temperature of 60 degrees. By giving too high a temperature the foliage is weakened, and it must be borne in mind that the plants make their principal growth for the season after the flowers are past, so that too early forcing is apt to endanger the health of the bulb. After blooming, the pot plants should be kept in an open frame till the end of September, with some loose material, such as stable litter, between the pots to prevent too rapid evaporation of moisture; feed them frequently with liquid manure. A deep frame heated so as to exclude frost will be found the best place for the pot plants during the resting season.

For outdoor culture by the end of May bulbs may be planted in a border sloping to the south. Immediately after planting give a heavy mulching of manure, and to insure continuous growth keep them well watered during dry spells, otherwise, when the time comes for lifting the plants, some will be at rest, others in full vigor of growth. In the latter case the transfer to the flower pot cannot be effected without detriment to the bulbs; the roots are large, preventing a suitable quantity of soil being given while using a pot within a reasonable size.

Propagation. It is a trifle costly to raise the finer kinds of Amaryllis from seeds secured as a result of cross pollinating the

flowers of the best varieties, but by this method very many fine forms result. Our collection is usually at its best about the middle of February, when cross pollinating is performed. The seed vessels take about six weeks to ripen. The seed is spread out for a few days to dry and sown in boxes near the end of March. By the beginning of June the seedlings are in 2-inch pots. Quite a number of the bulbs send up good sized flowers the second year. During the third year all of the bulbs will be in flower; many of the flowers will be from 10 to 12 inches in diameter. This is greenhouse work, but bulbs can be grown to perfection in the Bermudas and other places having a high Winter temperature, thus reducing the cost considerably. One would imagine that a good paying industry could be started in Bermuda by growing the finer varieties and disposing of them to the florists in the United States. The plants may also be propagated by offsets which may be separated from the pot plants during the operation of potting, or taken from the old bulbs when lifting in the open border in Autumn. In the latter case they may be stored for the Winter in boxes of sandy soil, and either potted off in Spring or planted out with the larger bulb.

HYACINTHUS (Hyacinth). For garden culture many persons feel that the Hyacinth is too stiff and formal, but they are quite satisfactory when grown in geometrical beds of different shapes. The best effects are obtained by planting in solid colors and having all the heights the same. Small bulbs are known as miniatures and are useful for informal planting and are also useful for cutting. Single Hyacinths are more satisfactory for outdoor planting than double ones. They appreciate a lighter soil than most bulbs, and it is advised to set the bulbs on a thin layer of sand. They, of all bulbs, need protection in Winter. (See also page 242.)

IRIS, BULBOUS. Unlike the German and Siberian Iris, *I. xiphioides* (English) and *I. xiphium* (Spanish) are bulbous. The bulbs are cheap, and yet so few of this class of Iris are planted that we wish to commend this excellent group. Plant them in good, friable, well drained soil, the latter part of September. They will bloom the next year in May. The Spanish Iris will start into growth immediately upon being planted. The English will wait until Spring before sprouting. The two sorts are easily distinguished. The English have wider petals and are found in blue and violet only; the Spanish are often yellow as well as blue, white and other shades, and have comparatively narrow petals; they also bloom two weeks earlier. The bulbs are subject to a rot which is best prevented from

spreading by digging the bulbs after the leaves have matured. To many people *I. reticulata* is the aristocrat of the genus but florists do not give it the attention it deserves. It is rarely seen in a flower store. Out of doors it will bloom before the snow has melted; that having happened several times in recent years. It was planted by the side of a wall facing south. The color of the flower is that of the Violet, but darker, and the fragrance is also that of the Violet. A few bulbs in a 4- or 5-inch pot make a very fine showing. One of the reasons why we seldom see it is probably because the bulbs remain too long in the seed stores and are pretty well dried up before planting. This gorgeous Iris will not stand this treatment; it should be in the ground by the latter part of August. The species should certainly be given a trial by florists. When established it keeps in good condition out of doors for a long number of years. The bulbs when planted in pots are very easily forced, provided they make their roots early enough. Seeds are produced more or less freely. There is no doubt that it will become popular when its culture is better known. There are one or two varieties differing mainly in the colors of the flowers. When well grown out of doors it usually sets seeds the second season after planting. If sown as soon as ripe the seedlings will bloom in about two years. (For other Irises see page 193.)

LACHENALIA (Cape Cowslip). The Lachenalias are not common and should be more grown, not for cutting, as the flowers are not suitable for this purpose, but for pot plants. The leaves, even by themselves, are very attractive, being broad, rich green, and spotted with brown. The flowers are greenish red and yellow arranged in spikes. *L. tricolor* var. *Nelsoni*, a bright yellow and green flowering sort, is the commonest. Small bulbs should always be saved and grown on, as they increase in size quickly under cultivation.

Culture. By the first of August Lachenalia bulbs should be knocked out of the pots, the sizes sorted and the largest put, say four together, in a 5-inch pot, and plunged for the time being among ashes in a frame. The smaller bulbs should be potted or boxed for growing on.

Propagation. The bulbs multiply rapidly.

LEUCOJUM (Summer Snowflake). This bulb should always be grown in herbaceous collections. *L. aestivum* grows to a height of 18 inches and its remarkable appearance in flower is very pleasing. It is at its best about the beginning of May. *L. vernum*

is not so tall as the first named, but the flowers are larger and the plant more dwarf.

Propagation. They are propagated from seeds sown as soon as ripened. Some increase rapidly by the division of old clumps.

LILIUM (Lily). There are probably over 100 species of Lilies, all natives of the Northern hemisphere.

Greenhouse Lilies. The species used so much for forcing in pots is known as *L. longiflorum*, a native of China and Japan. A number of varieties are now used by the florist. *L. l.* var. *formosum* is a quick forcing sort; *L. l.* var. *giganteum* is especially used for the Easter trade and is the sort commonly kept in cold storage for all-the-year use. Besides these, *L. l. Harrisii* and *L. l. multiflorum* are used. *L. candidum*, the Madonna Lily, is of lesser importance for forcing, but is exceedingly attractive.

Culture. The bulbs should be potted as soon as procurable, and plunged in a frame with a bottom of sifted cinders; the plunging material should be cocoanut fiber, leaf soil, or thoroughly rotted hotbed material. This precaution works well in maintaining an equal state of moisture in the pots without the necessity of frequent waterings. To prevent the sun drying the surface of the soil enough covering of loose stable litter should be given. Remove the plants indoors on the approach of severe weather. For early forcing the pots may be placed directly on the bench of a cool greenhouse, and precautions taken to keep the soil in an equably moist state, avoiding either extreme. These bulbs should also be covered with some light material to prevent baking. The pots used should be small enough, so as to provide for a shift into 6- and 7-inch sizes as the plants require it. Much better results are thus obtained, because roots are formed on the stem of the Lily above the bulb, and often above the soil, when they are planted directly into their flowering pots, and especially when they are planted with the tops of the bulbs level with the surface of the soil. So it will be seen that a shift given after the plants have made considerable headway will work advantageously in supplying new rooting material, not only for the roots already formed in the soil, but for those forming on the stem above it.

In potting put one large piece of broken pot, concave side down, over the hole in the bottom, and over this some half-decayed leaves, not moss, as the latter retains too much moisture at the bottom of the pot; ram the soil moderately firm. The soil should have good, fibrous loam, enriched to about one-fifth of its bulk with



LILIUM CANDIDUM (MADONNA LILY)

well rotted stable manure; this, with the addition of some broken up charcoal, is as much for the purpose of keeping the soil open as for feeding. The aphid is one of the worst enemies of the Lily when grown indoors, and the conditions favorable to its increase should be guarded against—keeping the plants in perfect health is the best preventive measure. Some of the things to be avoided are sudden changes in temperature, chilly drafts, soil too wet or too dry. Fumigating or vaporizing with tobacco must frequently be resorted to whenever the aphid makes its appearance.

Preparing Bulbs for Potting. If, as is frequently the case, the bulbs on arrival are a trifle shrivelled, do not pot them immediately, as they are apt to get a setback by so doing. The treatment they get should be directed to restore the bulb as soon as possible to that condition in which it was when taken from the soil. This can be done in the following manner much more quickly and with better results than when potted immediately into soil. A cool, moist propagating house is an ideal place for the operation. Place the bulbs as close together as they will go in the moderately wet sand. They may be either covered with sand for a day or two, without wetting, or covered with papers during the driest and hottest part of the day, until they get plump and fresh-looking, taking care that they be potted just before the roots break through, for if potting be done after the roots make their appearance more harm than good will result.

L. Speciosum. At the season when Roses and Carnations are scarce, both in and out of the greenhouse, a grand substitute may be found in the Japanese Lily, *Lilium speciosum*. It is one of the best, if not the very best, so far as graceful structure of flower is concerned, being far ahead of the popular variety of *L. longiflorum* in this respect. *L. speciosum* was introduced from Japan; it was then erroneously called *Lilium lancifolium*, a name by which it is still known in many places. The species is extremely variable in form and color of flower, color of stems, foliage, buds, and even in the anthers. Among the whites, *L. s. Kratzeri*, imported direct from Japan, is one of the finest. This variety has greenish stripes down each of the six divisions of the flower; the anthers are brown. *L. s. album-novum* has larger flowers, with bright yellow anthers. *L. s. album*, grown in Europe, gradually becomes tinged with pink. *L. s. punctatum* has white flowers dotted with pink. The principal pink or carmine forms are *L. roseum rubrum*; others are *Liliums Schrymakersi*, *cruentum*, *purpureum*, *purpuratum*, *magnificum* and

superbum. The natural period for blooming outside, according to locality, is from the end of July till September. A variety called *L. Melpomene*, which sometimes gets to be 6 feet high, was raised by the late Mr. Hovey, of Boston, many years ago. It was said to be a hybrid between *L. speciosum* and *L. auratum*. It is larger than *L. speciosum* but dies out readily from no apparent cause.

It may be stated for guidance in the cultivation of *Lilium speciosum* that it is perfectly hardy here in well drained light soil, that is, on raised rockwork; but unless the bulbs are lifted at intervals of two years and immediately replanted in freshly worked soil, with manure added, they get smaller and smaller, ultimately dying from starvation. For pot cultivation and to bloom early in Summer *Lilium speciosum* it is one of the easiest to manage, but less trouble will be experienced by planting out in raised beds, giving the necessary protection from severe and late frosts in localities where those conditions exist.

Hardy Lilies. Everyone who has a pretty garden, some time, sooner or later, takes up the growing of Lilies. They are the charm of the border wherever they are planted. Success with Lilies is not difficult if one confines himself to a few sorts which he can grow. Lilies are of such diverse requirements that it is only by careful preparation of soils and individual study of their needs that all kinds can be grown successfully in any one location. The Tiger Lily, *L. tigrinum*, seems to grow as easily as most weeds and is not even choked by them. Other Lilies prefer good soil, usually light and enriched heavily with peat and leafmold. Manure should not be used except as a mulch. In planting Lilies, then, it seems best to either add the needed sand, peat and leafmold or to actually remove the native soil to a depth of $2\frac{1}{2}$ feet. A good thick layer of leaves or leafmold is always beneficial as a Winter mulch unless there is a growing ground cover.

In Spring the young shoots are frequently injured by late frosts and it is well to use a few evergreen boughs. For the landscape they are easily combined with shrubbery or the herbaceous border, where they are perfectly at home. The Wild Yellow or Canada (*L. canadense*), the Turk's Cap (*L. superbum*), and the Yellow Speciosum (*L. Henryi*) succeed admirably in beds of Rhododendrons; especially when the Rhododendrons do not crowd them too much. The Gold-banded Lily (*L. auratum*) should be planted among shrubs so that the roots are continually shaded, and where a fair degree of moisture is maintained. The Coral (*L. tenuifolium*), and the Thunbergian Lilies (*L. elegans*), are excellent planted among ferns

which furnish an excellent landscape effect besides. The Madonna (*L. candidum*), grows nicely by itself and is most useful for clumps under pergolas or as an edging for walks.

MUSCARI (Grape Hyacinth). *M. botryoides* is a little gem for the garden. The blue and white miniature bells, when seen in mass, are most attractive either in the border or when naturalized in grass or woodland. There are several other forms which are intensely interesting, especially the plumed or feathery Grape Hyacinth (*M. plumosum* var. *monstrosum*). In this the floral parts are much elongated and appear very feathery. It grows only 6 or 8 inches tall and needs to be planted in the very front of border or in rockery.

NARCISSUS (Includes Daffodil, Jonquil and Chinese Sacred Lily). There are a great many types and species of Narcissus. So great is the difference of opinion concerning them, even by botanists, that we will not try to present a complete outline of them, except to say that the following may help to classify the various types:

Long Trumpet. To this class belong all varieties with distinct tubular centers which are as long as the outer parts of the flower. They are known as *N. Pseudo-narcissus*. There are two groups of the long trumpet Narcissus; the self colors and the bicolors; besides these there are singles and doubles. The doubles are termed Daffodils.

Medium Trumpet. To this class belong all varieties with distinct tubular centers, which are about half as long as the outer parts of the flower. When the flower doubles the tubular centers are really present but are much divided. The doubles are known as *Phoenix* varieties and the singles include the *Incomparabilis* and *Leedsii* varieties.

Short Trumpet. To this class belong all varieties in which the tubular center is a mere cup or even a ruffle. The flowers of some of the varieties belonging to this group are borne in bunches of from three to ten blooms. They are called *Tazetta* or *Polyanthus* varieties. They are not hardy and should not be planted out of doors. Varieties representative of this group are: the Chinese Sacred Lily, the Paperwhite Narcissus (which is so easily grown in pots), and the yellow Soleil d'Or. Varieties which merely have a frill at the center are Poet's Narcissus, *N. poeticus*. They are very adaptable to garden culture and often spread very rapidly. The catalogues term them *poeticus* varieties. They should not be con-

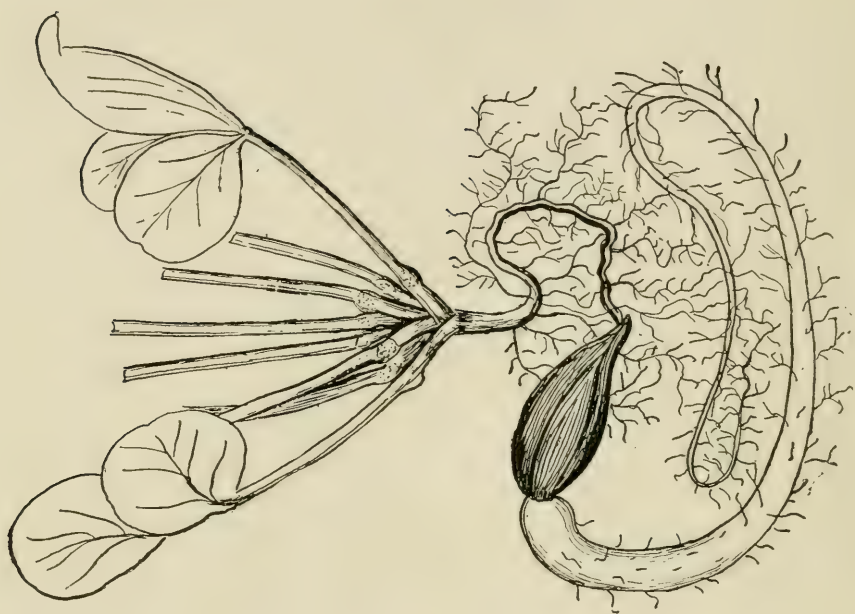
fused with the *Poetaz* varieties, which are hybrids between *N. poeticus* and *N. Tazetta*; these are not very hardy. A third class are the Jonquils, *N. jonquilla*. Many persons call any single Narcissus a Jonquil; this is a mistake. Jonquils have very slender leaves; the flowers are either single or double, very sweet scented and produced in clusters of from three to six. They are hardy in the North with protection.

OXALIS. Some of the best kinds are *O. cernua*, yellow; *O. Bowiei* and *O. hirta*, pink, and *O. versicolor*, white. *O. rubricaulis* is desirable not so much for the flowers as for the highly colored red stems. *O. Bowiei* and *O. versicolor* are well suited for baskets, for hanging in conservatories. The last named requires very little heat.

Culture. The main batch of Oxalis for Winter flowering should be potted up by the middle of October. Put a single bulb in each pot, using 3-inch pots to start with, and shifting on the plants as they need it until they are in 5- or 6-inch pots, in which they bloom. When several bulbs are potted together in a large pot, at first they are certain to produce foliage in abundance and but few flowers. By the middle of June the bulbs will be dried off; this is accomplished by withholding water and turning the pots on their sides. Be careful to place them so that the soil is exposed to view, as mice are exceedingly fond of the bulbs. All of the kinds grown for their flowers in Winter are very prolific in the production of new bulbs, that is, if sufficient root room has been given for their perfect development during the growing period. Home grown bulbs are very superior to those imported.

POLIANTHES (Tuberose). *P. tuberosa* is grown largely for supplying white flowers during Summer and Fall months. The tall double form is grown mostly by florists. They may be put in the ground after danger from frost is past, and at later intervals to give a succession of flowers. The finest bulbs are supplied so cheaply by American growers, that it does not pay to propagate in small quantities.

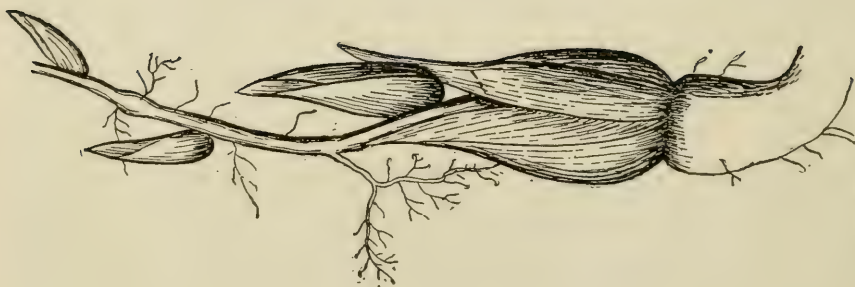
RANUNCULUS (Persian and Turban Buttercups). Within recent years the Persian Buttercup, *Ranunculus asiaticus* and its variety *africanus*, the Turban Ranunculus, have come into prominence. The flowers resemble a Buttercup, but they are over 2 inches in diameter and extremely double. Varieties of all colors but clear blue are on the market. The roots resemble small Dahlia tubers. These Ranunculi are not hardy. At present the most popu-



SHOWING GROWTH FROM BULB

FIG. 19

OXALIS BOWIEI
See page 271



BULB PROPAGATION

lar varieties are: Romano, the commonest bright scarlet variety; Hercules, the best white; Citron, a clear yellowish orange; Souci Doré, a brownish orange; Grootvorst, a handsome light carmine.

Outdoor Culture. As the *Ranunculus* blooms in late May and early June and is not hardy, the bulbs must be planted in a partially shaded spot as soon as danger of frost has passed. They should be planted about 2 inches deep and 6 inches apart and should be surrounded by sand, both above and below the bulbs. After the leaves have matured in August the bulbs should be lifted and stored in a cool place.

Greenhouse Culture. The plants should not be forced by great heat; 40 to 50 degrees is sufficient. High temperature will cause weak and crooked stems. A second requirement is good drainage; abundance of moisture causes the bulbs to decay. Commercially, the bulbs are placed in flats or benches and planted in late October and are kept cool to form roots. They will bloom from February to late March.

Propagation. They are propagated principally in Holland and are grown from seed in three years. Before the war three or four millions were shipped to France each year.

SANDERSONIA. *S. aurantiaca* is one of the prettiest species of the Lily family, but one seldom sees it in good condition. Its claim for attention lies in the peculiarly shaped flowers which are slightly bell shaped and pendulous. It does well planted out in peaty soils. The tubers should be carefully collected on the approach of frost and replanted in Spring. The tubers keep well in dry sand during the Winter months. Give about same treatment as for *Gloriosa*.

Propagation. Seeds are produced only sparingly.

SCILLA (Squill, includes Wood Hyacinth). The Scillas are for the most part Spring flowers, and are not much used by florists, but they are useful and beautiful out of doors. *S. nonscripta* (*nuttans*) is the wild Hyacinth. *S. sibirica*, the Siberian Squill, and *S. bifolia* are good dwarf species. *S. italica*, the Italian Squill; *S. puschkiniioides* and *S. campanulata* (*hispanica*), the Wood Hyacinth are all worth growing. They are generally able to persist without coddling for many years; they are supplied by dealers.

Propagation. Some of the best of the species are easily raised from seeds, although the bulbs naturally divide.

TECOPHILÆA (Chilean Crocus). *T. cyanocrocus* and the form named after Max Leitchlin produce beautiful blue flowers.

In Washington they thrive splendidly when planted on rock-work. The odor of the flowers is that of the Violet.

Propagation. They are propagated from self sown seeds and from offsets.

TIGRIDIA (Tiger Flower). The common species, *T. pavonia*, and the many varieties of this beautiful plant outclass all members of the Iris family for brilliancy of colors.

Culture. The care necessary to get them to bloom in Summer is much like that for Gladiolus. The corms should be kept dormant until warm weather arrives by placing them in pots of dry sand. They are planted in late Spring. The corms should be lifted before freezing in the Autumn.

Propagation. The corms multiply by natural division.

TRICYRTIS (Japanese Toad-Lily). *T. hirta* is a curious but beautiful plant. It is the latest of the hardy herbaceous plants to come in flower. It usually blooms in October and November. During Summer the foliage is quite ornamental. The individual flowers, of which there are many on a stalk, are shaped like those of a Lily, only much smaller. The flowers are pinkish white, spotted with purple. This subject should be planted in moist soil, or where a mulch can be given, in order to preserve the foliage till the blooming period.

Propagation. The plant divides easily, or cuttings may be made from the flowering stems and put in a coldframe late in the season.

TRILLIUM (Wake Robin). About a dozen species of these beautiful and interesting native plants are in cultivation. *T. grandiflorum* is the one most commonly grown, owing to its very large white flowers. Its culture is of the simplest description, requiring a half-shaded position with abundance of vegetable humus in the soil. It is sometimes grown in pots for early forcing, for which purpose it is well adapted. The rhizomes should be potted as soon as the plants are at rest, late in Summer, and plunged in a cool frame until wanted. With very little heat they will flower several weeks in advance of their usual time.

TRITONIA (Blazing Star). *T. Pottsii*, which usually goes under the generic name Montbretia, is a plant of the Iris family with orange colored flowers. It survives zero temperatures in Washington with no snow on the ground. There are many other species. This plant with many others could be gotten up in quantity for

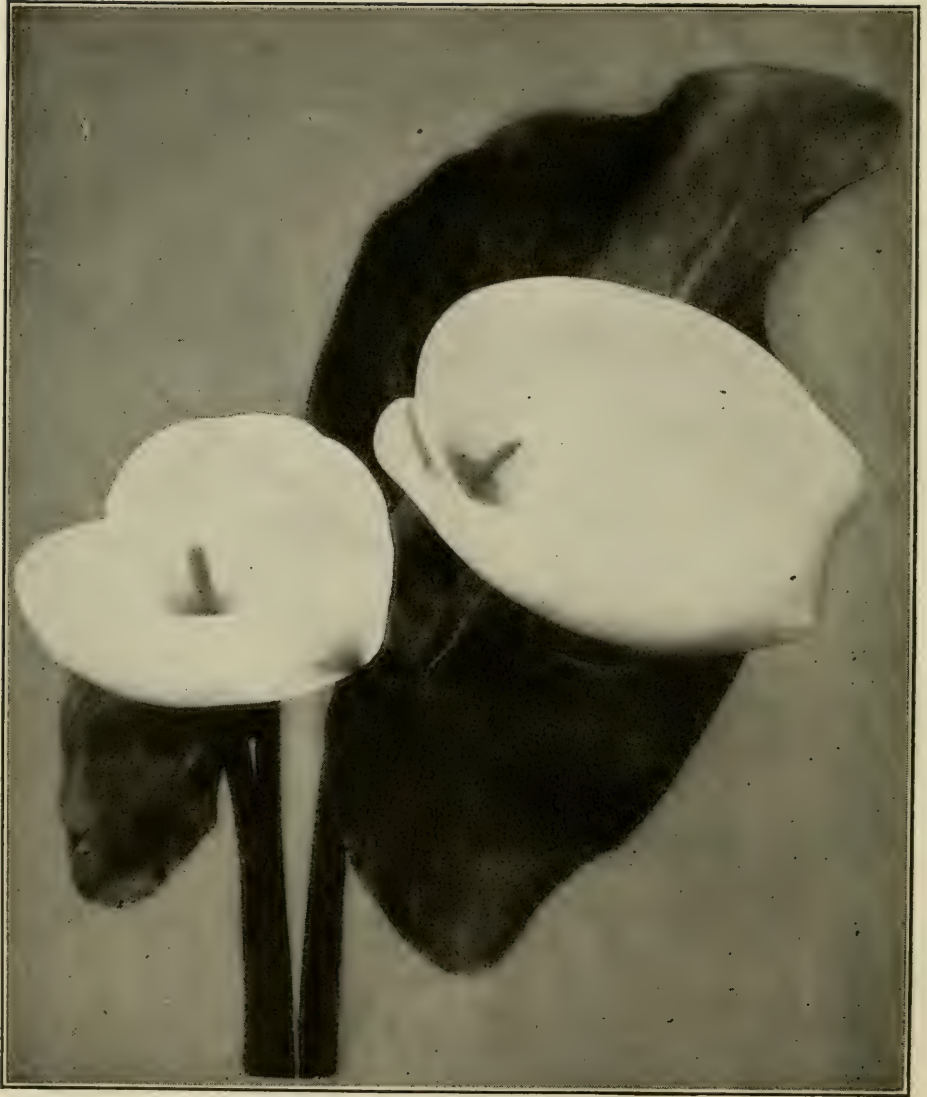
cutting. Farther north it stands the Winters by placing a quantity of leaves over the crowns and these held in place with a spadeful or two of soil thrown over them.

Propagation. It is increased by division. Some of the newer varieties are very prolific bloomers. They are increased from seeds and especially by division in the Autumn.

TULIPA (Tulip). There are a number of forms of Tulips, all of which are interesting. The earliest Tulips are of the Duc Van Thol group (*Tulipa suaveolens*). The stems are rather short and they would not be commended for garden culture except for the fact that they are very early. They are usually characterized by rather pointed or laterally rolled petals. The midseason Tulips occupy most of the garden interest. Hundreds of varieties are pictured and described in the catalogues. This main group is often termed *T. Gesneriana*. It includes the peculiar fringed petaled group, known as the Parrot or Dragon, together with the Darwins with their subtle colors and long stems, as well as the May flowering or Cottage varieties, which possess the long stems of the Darwins, but the blooms, instead of being globular, are more or less bell shaped, the tips of the petals being reflexed. (For Culture, see head of this chapter, pps. 242, 243.)

VALLOTA (Scarborough Lily). The commonly cultivated species is *V. purpurea*, a very useful plant, either for the greenhouse or the window garden, but not of much service to the florist, as it flowers at a period when the demand for cut flowers is not very great. The flowers are reddish scarlet, several in an umbel; in appearance somewhat like those of an Amaryllis. The foliage is evergreen, but during the resting season the supply of water should be curtailed. As the bulbs will last in the same pots for several years, the drainage should be carefully arranged, and the soil mixed with crushed bone. During growth occasional waterings with manure should be given.

Propagation. The Vallota has a very curious method of making young plants. These young plants are produced to such an extent that the process tends to curtail the flowering propensities of the larger bulbs if attention be not given in the matter of removing them. In course of time they form two colonies, one on each side of the parent bulb. The bases of the leaves forming the bulb have each a small, bud like growth a considerable distance from the base or disk, but attached to the disk by a root like formation which continues active, after the swollen base of the leaf is



CALLA GODFREY

dead, in supplying nutriment to the young bulb until it sends out roots. When this little root like process is of no further use it gradually shrivels up. Afterward the young bulbs grow apace and rob the soil of the nourishment intended for the parent bulb. This provision evidently shows that the *Vallota* naturally grows deep in the soil and is intended to raise the bulblets near to the surface before taking root. These bulblets, unless intended for increasing the stock, should be removed as soon as they make their appearance above the soil.

ZANTEDESCHIA (Richardia. Calla Lily). These showy plants are grown for their pure white or yellow flowers and fresh green or marked foliage. *Z. ethiopica* is the commonest white species, useful for a pot plant and commercial cut flowers. *Z. Elliottiana* is a yellow species with long white, translucent spots scattered over the leaves.

Culture. Plants when not in bloom should have the water gradually withheld from them, and as the foliage dies down turn the pots on their sides and leave them in this position until the time arrives for starting into growth in Autumn. The pots should not be put in a place where the sun will have full play on them. For increasing the stock of the yellow varieties they should be grown all Summer; plant them outside in rich, well drained situations where they can be watered abundantly when occasion requires it. All of them are easily raised from seeds. In Winter they need a minimum temperature of 60 degrees. By the middle of September the largest sizes of *Z. ethiopica* should be in 6- and 7-inch pots and placed in an open frame. Have the sash handy so that they may be protected during wet weather. With a good watering at first they won't need much moisture till good roots are formed. At least one-third of rotted cow manure should be in the soil.

ZEPHYRANTHES (Fairy Lily). Most of the species of this charming genus are hardy at Washington and possibly much farther north, when they get protection. They should have a position which is fairly well sheltered and given a Winter covering of leaves. There are about a dozen species. *Z. candida* flowers in Autumn. *Z. Atamasco* is most largely grown and bears white flowers and blooms in Summer. *Z. carinata* bears rose colored blooms in Summer.

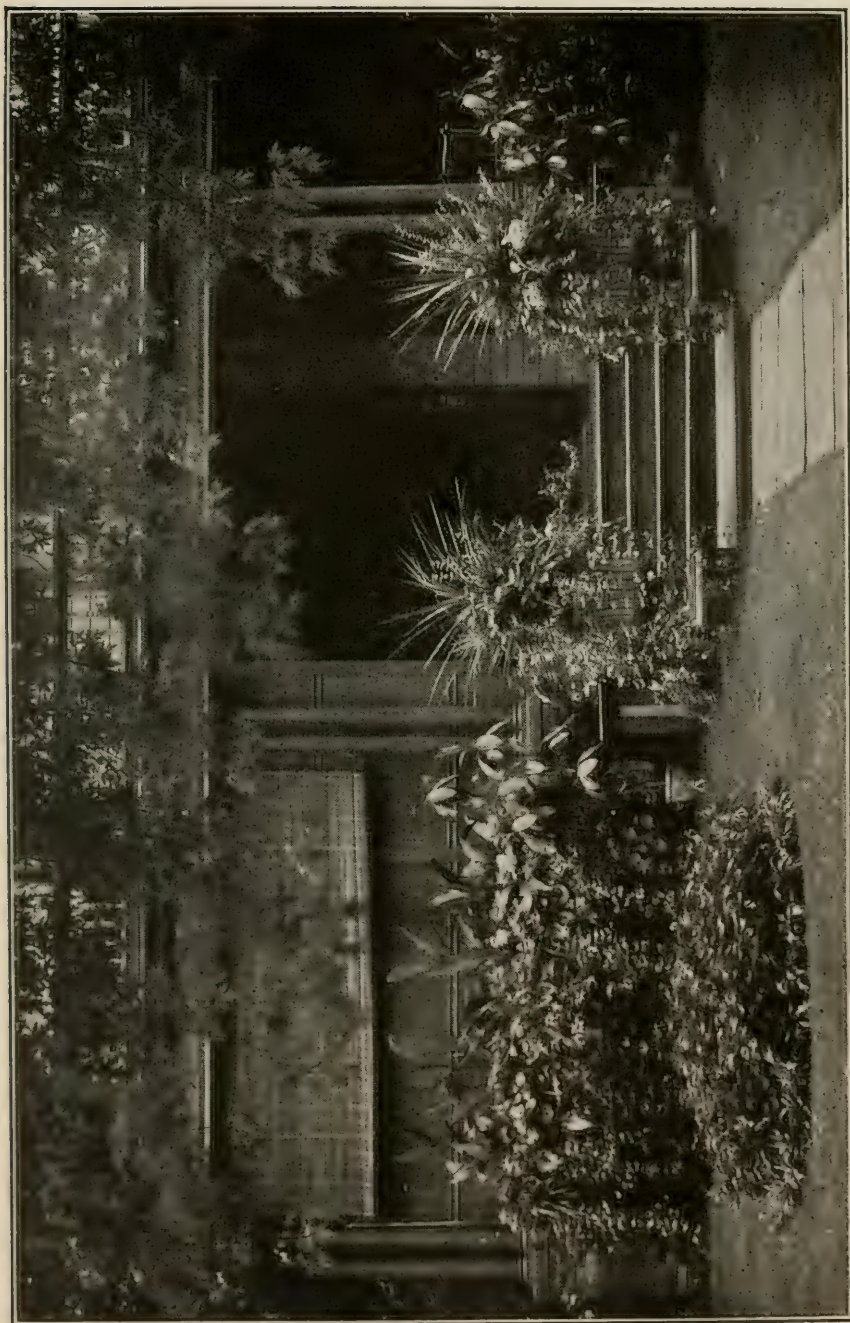
Propagation. They usually ripen a considerable quantity of seeds and may be propagated in this way, but it is cheaper to get the bulbs from dealers.

CHAPTER X

Bedding, Vase and Window Box Plants

Vases and Window Boxes. For indoor boxes for windows or other places where there is not much light the following plants will be found useful, as they are almost hardy, and, with ordinary care, they will last a long time in a presentable condition: *Rohdea japonica* and the variegated form will stand in the coldest places. These plants, by the way, are perfectly hardy here, the foliage being but slightly browned during the coldest weather. *Aspidistra lurida* and *A. l. variegata*, together with the spotted-leaved species called *A. punctata*, while not so hardy as the Rhodea, yet they will stand a good deal of cold. Of course, the plants will have to be small, in 5- or 6-inch pots. Old plants broken up for this purpose and immediately used are not to be depended upon, as the principal roots are apt to get severed in the operation. Many of the New Zealand Cordylines, with narrow, green leaves, can be utilized for drafty places; they will stand considerable frost without hurt if they have been grown cool. *Farfugium grande*, a broad leaved composite with yellow spots, is another well known plant which comes through zero weather all right. *Nipholobolus lingua corymbifera*, a tough leaved crested Fern, can be got up in quantity for use by division of the stems which grow near the surface of the soil. *Lastræa prolifica*, a dwarf dark, green leaved species; *Lastrea opaca*, *Pteris serrulata*, and *Adiantum Capillus-Veneris* are all pretty hardy, as well as ornamental species of Ferns good for the purpose.

When vases have to be filled with only one kind of plant, hardly anything will be found more appropriate than the Russelias. The branches are erect in a young state, eventually becoming drooping. If the plants are put in a light, rich soil, with abundance of water during the growing period, they will be in bloom most of the time. Only one-year-old plants should be used for large vases; that is, plants in 6- or 7-inch pots, as when of that size they soon become furnished with good sized branches. The old and well known *Russelia juncea* is the best for the purpose, although *R. sarmentosa* and *R. Lemoinei* are both good, giving a greater number of flowers,



WINDOW BOX GARDENING

which, however, are smaller than those of *R. juncea*. Among those plants needed for the center of vases, *Pandanus Veitchii* and the numerous varieties of the grassy leaved species of *Cordyline*, such as *C. australis*, are among the best. Last year's seedlings of the *Cordylines*, if they have been liberally treated, will be large enough by the beginning of the season for all ordinary purposes. They stand the hot sun well. *Pandanus Veitchii* colors well under full sunshine, but needs more water than the *Cordylines*. *P. Baptistii*, of which much was expected as an outdoor Summer plant, is rather disappointing, as its foliage is too tender for exposed places.

Other good flowering and trailing plants for vases and baskets, are the three species of *Torenia*, two purple and one yellow, besides the so-called white variety; and *Maurandia Barclaiana*, all of which may be grown from seed in a short time; *Mesembryanthemum cordifolium*; Parlor Ivy; all the trailing Vincas and *Abutilon vexillarium* are indispensable. The variegated Ground Ivy will stand the sun well in exposed situations; it is dwarf growing and comes in handy for planting around the edges of vases and baskets, where its long hanging growths can be seen to advantage. Stock of it, kept in boxes under the cover of sash, should be cut up during the early Spring, and small pieces with roots attached placed in sandy soil in boxes, and either returned to the frame or brought into a cool house, to be started into growth previous to potting.

ACALYPHA. There are about eight species and varieties of *Acalypha* grown as bedding plants. With the exception of *A. hispida* (*Sanderi*) they are ornamental foliage plants, having bronze colored leaves of varying shades. *A. Godseffiana* and *A. Hamiltoniana* are marked with creamy white margins. *A. Wilkesiana* has several variations, the best known of which are *A. Macafeana* and *A. musaica*. *A. hispida* has very ornamental pendant spikes of red flowers, produced in the axils of the leaves.

Culture. (For indoor culture see page 55.)

Propagation. Cuttings may be taken in the Fall before the cold weather injures the plants, but to save space the old plants should be lifted, cut back, and boxed or potted, starting them into growth in early Spring, when they push out from every bud giving abundant material for propagating.

ALTERNANTHERA. The *Alternantheras* form a class of brilliant leaved plants unexcelled for low carpet bedding. In Peru they are common weeds.



ASCLEPIA CURASSAVICA

Propagation. The dwarf and slow growing *Alternantheras*, such as *A. brilliantissima* and *A. paronychioides*, are unsatisfactory from cuttings, unless taken in late Summer and kept growing. When taken later they are apt to continue in a weak condition all through the Winter. But in either case they take up too much room in the greenhouse for nearly eight months. A much better method is to lift the old plants before the frost blackens them, cut over to within 3 or 4 inches from the roots; put the cut over plants as thickly as they will go in boxes; give water once and place under the benches of a warm house, where they will get some light. About the beginning of March bring the boxes up to the light, sprinkle about an inch of sand among the plants, and give water. Two weeks later divide the plants and pot them, when it will be found the pieces are much superior to plants from cuttings and make a better and quicker display in their Summer quarters.

ASCLEPIAS. *A. Curassavica* is a greenhouse plant in European gardens but may be used for bedding..

Propagation. Seeds sown first half of February, and the plants put out from 3-inch pots in May, will grow 5 feet high and 3 feet through, bearing myriads of yellow and red flowers. Seeds ripen freely on outdoor plants.

BEGONIA. A number of species of Begonias are used for bedding, principally the tuberous sorts, *B. fuchsioides*, and the many varieties of *B. semperflorens*. (See also pp. 70, 177.)

Propagation by Seed. Seeds of the bedding varieties should be sown by the beginning of January, to have the plants in good shape for Spring sales. Cuttings are often used, but they do not make anything like as good plants as those from seed. The seed should be sown in boxes or pans. Sterilize the soil used on the surface, firm well, water, then sow thinly without covering the seed, or with only a very small quantity of fine sand, covering the box or pan with a pane of glass until the seeds vegetate.

BELLIS (English Daisy). *B. perennis*, the common pink and white double Daisy of Spring, is most attractive for bedding as well as for use in the early window box. The plants are not perfectly hardy and should be wintered in a frame.

Propagation. The best kinds are perpetuated by dividing the plants after blooming, but in many parts of the country these plants do not survive hot weather. Seeds should be sown during September.

CANNA. (See Bulbs and Tuberous-Rooted Plants.)

CHÆNOSTOMA. A charming dwarf shrub, *C. hispidum*, is not so well known among florists as its merits deserve. It is useful in a number of ways, but principally as a plant for filling boxes or baskets. For rockwork, cemeteries or even as a bedding plant it is prettier than a number of the things commonly used for such purposes. It has a procumbent or decumbent habit, according to the position in which it finds itself, and has the great merit of being continually decked with a host of neat little pinkish white, star-shaped flowers.

Propagation. It is remarkably quick in making a bushy growth from the seedling or cutting stage. For propagation lift old plants in the Fall; keep in the greenhouse and take cuttings from the young growths early in the Spring.

DUSTY MILLER. There are a number of plants known as Dusty Millers. They are used on account of their foliage, which is densely covered with very fine white hairs, so much so that the

leaves have a whitish appearance. Two common species, *Senecio (Centaurea) candidissima* and *S. maritima*, are much grown.

Propagation. The most reliable method of propagation is from seed, which should be sown in Autumn. Cuttings may also be taken, avoiding those which are very robust. Give them treatment similar to that recommended for Gazanias. (See page 228.)

CODIÆUM (Croton). (See also page 100 for indoor culture.) It is only within recent years that these plants have been used to any extent in the open ground. They succeed well, putting on colors much superior to what we usually see indoors. Some of the higher colored varieties are unsuited for this work, as they need a high temperature at night as well as during the day. The following are the kinds which have been found reliable: *C. Lady Zetland*, *C. pictum*, *C. aucubæfolium*, *C. chrysophyllum* (one of the most satisfactory), *C. multicolor*, *C. interruptum*, *C. Veitchii* and *C. Weismanni*. As these may be grown successfully from 10 to 15 degrees cooler than *C. Reidii*, *C. Challenger* and others of that section, they should be given a trial even in the Northern States.

Propagation and Culture. The principal batch of cuttings for bedding plants is taken beginning of September. If there is no bottom heat by that time they will root splendidly in a close propagating frame. With bottom heat they root in the open bed, and the cuttings may be quite large. Allow quite a quantity of roots to form before potting. A minimum temperature of 60 degrees will be found sufficient during Winter for the above varieties. Before putting them in the ground they must be very gradually hardened off, otherwise they are apt to lose the lower leaves. Old plants in pots should be given a top dressing of bonemeal and plunged out of doors, to furnish cuttings.

COLEUS. Owing to the ease of producing young plants by slips, their rapid growth and very ornamental foliage, when planted out, the very numerous kinds will continue to be popular bedding plants. In Winter young plants should not be subjected to a lower temperature than 55 degrees.

Propagation. From a few plants grown from cuttings, put in during the beginning of September, a large quantity of young plants may be raised in Spring. In this latitude we have little use for hotbeds. In other localities, where the nights are colder during April and the first half of May, the hotbed is an indispensable adjunct to the greenhouse for developing plants such as Coleus from late rooted cuttings.

CUPHEA. *C. ignea* (*platycentra*) is the Firecracker Plant, bearing an abundance of fiery scarlet flowers. *C. Llavea*, known as the Red-White-and-Blue Flower, has large and handsome flowers, but they are not freely produced until the plants have made considerable growth.

Propagation. *C. ignea* is chiefly propagated by cuttings, but seeds may also be sown.

FICUS. The common Rubber plant, *F. elastica*, may be associated with such plants as Variegated Screw Pines, Crotons, Variegated Panax and *Dracena Sanderiana* in the formation of tropical groups of plants. They make very rapid progress when plunged in 5-inch pots shortly after being potted from 3-inch pots. All of these may be arranged where the full sun will strike them. The Ficus must be examined from time to time, to prevent the roots from establishing themselves outside of the pots. (For other notes on Ficus see page 121.)

GERANIUM. (See Pelargonium, page 288.)

HELIOTROPIUM (Heliotrope). *H. peruvianum* is grown principally on account of the sweet-scented flowers. There are dark and light lilac varieties, also a few with whitish flowers. Some years ago a very large flowered kind was sent out, but it had no perfume, and its first season was its last. The kinds will succeed best in full sun. Old plants should be wintered, planted out on a bench. A minimum temperature of 40 degrees will suit.

Propagation. From these plants abundant material for propagation may be had in early Spring.

IMPATIENS (Balsam). Two sorts, *I. balsamina*, Lady Slipper, and *I. Sultani*, the Zanzibar Balsam, are grown. In former years many florists depended to a great extent upon the white Camellia flowered Lady Slippers for supplying material for designs during Summer. The crop is sometimes disappointing, owing to a large percentage of the seedlings bearing semi-double flowers. Those plants with very double flowers do not set seed very freely, of course, and the temptation is evidently great, in gathering a seed crop, to collect the capsules from the very abundant crops on the single flowered plants to the exclusion of those on the doubles and semi-doubles. A few plants of the best types carefully lifted from the field during dull weather and put indoors, will seed more freely than when left at the mercy of wind and rain. The Zanzibar Balsam is used for greenhouse decoration as well as a bedding plant; the colors are distinct and bright.

Propagation. For late crops the seeds of *I. balsamina* may be sown out of doors and transplanted. To have them in bloom early sow in shallow hotbeds and transplant about the middle of May, earlier or later, according to locality. *I. Sultani* may be raised from seed sown in March, but is usually grown from cuttings.

IRESINE (Achyranthes). As a bedding plant, treat much the same as Coleus. *I. Lindenii* has pointed leaves of a deep blood red; *I. Herbstii* has rounded leaves with a deep notch in the apex; the type is purple red, but the var. *aureo-reticulata* has yellow veins and green or reddish green leaves. They will stand a lower temperature than Coleus.

Propagation. Cuttings put in during September can be used as stock plants in the Spring.



MUSA ENSETE (BANANA PLANT)—See page 287



LANTANA

ISOTOMA. In Europe *I. longiflora* is grown as a greenhouse subject. In America it is one of our most showy white flowering biennials for the open border. The plants before coming in bloom are anything but attractive, as they closely resemble some of our common coarse growing weeds. The flowers, on large plants, are anything but sparingly produced; they are pure white, an inch or so across the petals.

Propagation. Sow the seed in a cool greenhouse in the Autumn, or in a warm house early in Spring. Each plant will ripen an immense quantity of seed.

LANTANA. Low growing greenhouse shrubs with yellow, white, red and purple flowers in small, close heads. *L. camara* and *L. Sellowiana* (*delicatissima*) are principally grown. The latter sort has lilacy rose flowers and is trailing in habit. They are perfectly at home in the open border, growing most luxuriantly in heavy, well manured soil. The leaves and flowers have an undesirable odor, which is against their ever becoming very popular. A minimum temperature of 50 degrees will suit all of the kinds.

Propagation. Take cuttings early, and from plants thus raised they may be further propagated during February.

MUSA (Bananas). The ordinary fruiting Bananas for sub-tropical bedding will do well in almost any part of the country. The hardiest species of the genus, and one splendidly adapted to our Summers, is known as the Abyssinian Banana, *M. Ensete*. *M. superba* is a species somewhat resembling *M. Ensete* and is of slower growth. The foliage is slightly covered with a farinaceous looking substance. In Winter the leaves die down, the bases of which form a resting bulblike formation. It should be started into growth before planting out. If there is difficulty in disposing of them, which is not likely to be the case, as in every community there are some people who like things which are uncommon, then use them for the decoration of the home grounds with such plants as Cannas, Eulalias and dark leaved Ricinus. This combination will make a display that will be hard to equal.

Culture. In one season from seed, they will, under favorable conditions, grow 6 feet high, and if lifted, kept over Winter and planted the second season, they will develop into very large specimens. They delight in rich soil. There are few things easier to keep over Winter. On the approach of frost the leaves should be shortened back by two-thirds of their length, the plants lifted, roots shortened back considerably, and stowed as thickly together as they will go in a box and placed in some out of the way corner where frost will not get at them. They will pull through the Winter safely, in a pretty low temperature. When planting out time comes they are rather uncanny looking objects for the center of a bed; but they are not long in developing a crop of leaves.

Propagation. With a plant or two to start with, no trouble need be experienced in getting up a stock, as many sorts sucker

freely from the bases of the old stems. *M. Ensete* and *M. superba* do not sucker like the ordinary edible fruited varieties, but are easily raised from seeds. Sow them the latter part of January in the sand bed of a warm propagating house, and pot off the seedlings when they have developed three or four leaves. They may be potted earlier if kept in bottom heat.

OTHONNA (Little Pickles). *Othonna crassifolia* will stand full sunshine with very little water. It is of procumbent growth with small, yellow flowers. Lift a few old plants before frost, and merely lay them on the front of a sunny bench. A dozen or two nice little tufts may be potted up from a single plant.

OXALIS. For outdoor blooming during September and October knock out a few plants from their flowering pots and start some of the largest bulbs about the middle of July in 3-inch pots. Use light soil. Some of the plants will be in flower inside of a month. They can be used as bedders, to take the places of plants which die off as the result of warm weather; for instance, Ten-Week Stocks, Lobelias and Pansies. *Oxalis Bowiei*, *O. hirta*, and one which goes under the name of *O. crydentelles*, are all very suitable for this kind of work. (For other species see page 271.) Plants which were in bloom during the Winter and Spring may be started for this purpose after a few weeks' rest.

PANDANUS (Screw Pine). For bedding purposes the best plant in this genus is *P. Veitchii*. It will thrive in almost any position, but it makes better leaves in full sun than it does in shade. As young plants increase in value up to a certain size, they should be put out in their pots, and once or twice during Summer should be examined at the roots and larger pots given if necessary. The roots are large and soft, and when they grow over the sides of the plunged pot and into the surrounding soil they are difficult to manage afterward. (See also page 143.)

PELARGONIUM. (Includes the various Geraniums.) The most commonly cultivated Geranium is *P. hortorum*. It is difficult to find a substitute for this plant for outdoor bedding or pot culture. It is of the easiest culture, continually in flower and seldom injured by insects or diseases. *P. peltatum* is the Ivy Geranium and is very useful for the window box or hanging basket. The Fancy or Show Pelargonium, also called the Lady Washington Geranium, is again becoming popular as a greenhouse subject, and the variety Easter Greeting is an excellent pot sort for Easter and Spring. A fourth

group of Geraniums includes those called Rose, Lemon, Nutmeg, and Oak-leaved Geraniums, because of their fragrant leaves.

Culture and Propagation. Cuttings are rooted during the end of September or first half of October, according to locality. Plants that are well developed without being "drawn" are best for supplying cuttings. The usual method is to put each cutting in a thumb pot and stand these close together for the time being in a frame or cool house. Leafmold, sand and loam in equal parts will answer as a soil. Give one watering, enough to moisten the soil; subsequent waterings will be necessary only when it gets dry. Take the cutting immediately under a joint and shorten back the large leaf blades one half. By the end of the year they should be shifted into 3-inch pots, using stronger soil, and a month or six weeks later the plants will give a batch of cuttings which may be potted like the first lot. A hot, stagnant atmosphere must be avoided at all times. A saving of time and space may be accomplished, together with providing equally fine plants, if the old method of propagation be adhered to. This consists in putting the cuttings, made with the leaf blades shortened somewhat, into boxes pretty thickly together, standing the boxes outside, partly shaded from the sun until they root. Little water is given during the operation, and heavy rains are to be guarded against by having sash ready to cover the plants. The soil used should be such as to enable the rooted cuttings to thrive in it until January when they are potted up. If kept on the dry side they will bear considerable cold, and will be prevented from making too rapid growth. By this method there should be no necessity for putting in a second batch of cuttings from the tops of the first lot. Give this method a trial on a small scale, until familiar with its working.

The Show Pelargoniums prefer a cool, moist house and do not succeed under hot and dry conditions. They are quite often seriously troubled by white fly, which can be controlled if they are diligently fumigated with cyanide of potassium. Regarding the propagation, Mr. Fritz Bahr writes:

"The finest Show Pelargoniums I ever had a chance to behold were plants grown from cuttings rooted the end of August. They were potted up afterward and kept shifted and growing in a cool house all Winter, and flowered in 7-inch and 8-inch pots the following Spring. The house they were in consisted of a 12 feet frame structure and a poor one at that, but they got the full attention of a good man and along with them were grown some wonderful Ivy

Geraniums treated the same way. A good porous soil was made use of, mixed with horn shavings, from January on. The Ivy Geraniums were grown on trellises fully 5 feet high, each plant having from 30 to 50 flowers open at a time, and all were sold at a good price."

PENTAS. *P. lanceolata* (*carnea*) is more familiar as a stove plant than for bedding purposes. They resemble Bouvardias. *P. l. Quartiniana* is rosy flowered and superior to the type. In the warmer parts of the country, however, it will give three months of rather showy bloom.

Propagation. Treat the cuttings similarly to those of Lantana.

PERISTROPHE. *P. angustifolia* is a rather loose growing, but dwarf and finely-variegated plant, useful for vases and baskets.

Culture. They thrive best in partial shade and a rich loam containing some leafmold.

Propagation. Propagate in Spring, taking cuttings from lifted plants.

SANCHEZIA. *S. nobilis* puts on a very rampant growth when placed out of doors in rich soil. The flowers are yellow with red bracts and the leaves are attractively cut. Although a bed of Cannas may look best by themselves, a border is often wanted of some other plant; this species will answer well for such a purpose.

Propagation. Good sized cuttings root very freely. They may be wintered in 3-inch pots in a moderately warm house.

SANTOLINA (Cotton Lavender). *S. chamæcyparissus* (*incana*) is a dwarf, shrubby plant with silvery-white, fragrant foliage. It will thrive in almost any position with very little attention. It is valuable for its distinct foliage.

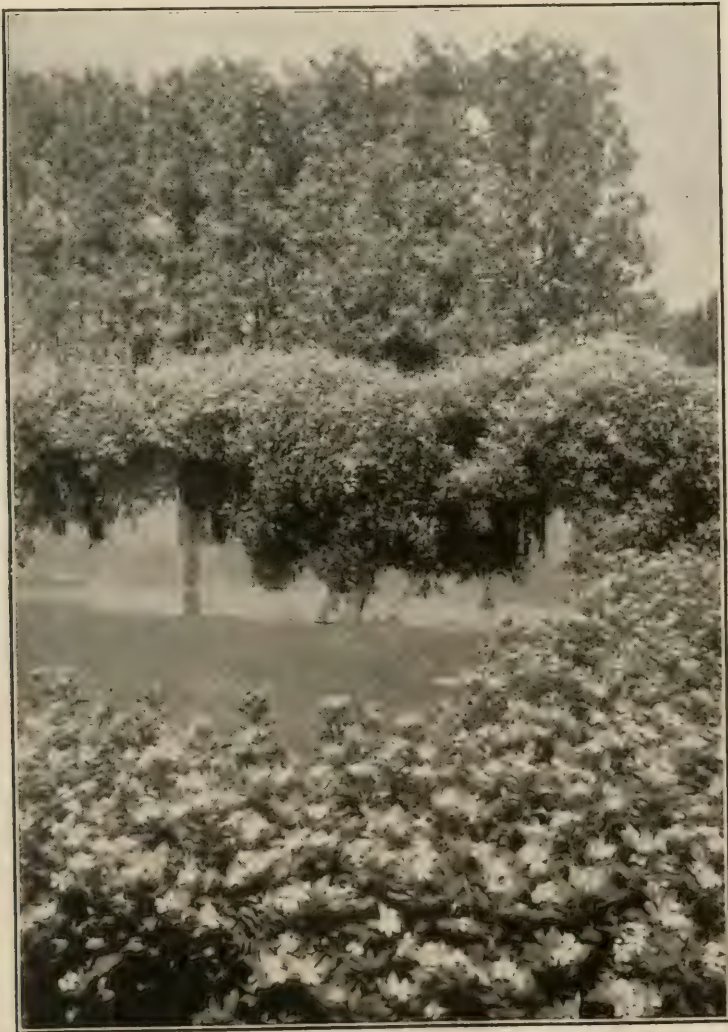
Propagation. Cuttings should be put in during the first half of October; they will root in a coldframe.

SAXIFRAGA (Aaron's Beard). *S. sarmentosa* is a very hardy species with ornamental flowers and foliage suitable for baskets, vases and boxes. There is a variegated form with showy foliage. It thrives out of doors all the year round in positions partly shaded from the sun. By the first of March fair sized plants may be put in 3-inch pots.

Propagation. By natural offsets, which are abundantly produced.

SENECIO. *S. mikanioides*, the German Ivy, is a useful, soft-growing vine with leaves the shape of the English Ivy (*Hedera*). Propagate a few plants in the Autumn, and from these a great number of cuttings may be taken off early in Spring. The plants are principally used for growing over the sides of baskets, vases, and also for twining to supports.

STROBILANTHES. *S. Dyerianus*, especially in a young state, has foliage suggestive of some of the highly colored Bertolonias



VINCA ROSEA, WITH CLEMATIS IN BACKGROUND

Its treatment should be similar to that given the *Coleus*, so far as wintering and propagating are concerned. When planted out in the full sun, the leaves are apt to have a washed out appearance, especially on old plants. A situation having partial shade is best.

VINCA (Periwinkle). *V. rosea*, the Madagascar Periwinkle, comes in three forms known as *V. rosea*, the pink; *V. r.* var. *alba*, the white; and *V. r.* var. *oculata*, a white with a pink center. They are very satisfactory bedding plants and come true to seed. *V. major* var. *elegantissima* comes in very serviceable, not only for vases and baskets, but for indoor decoration. Specimens for this purpose should be in 5-inch pots, or even larger. The leaves are green mottled and blotched white or yellow.

Propagation. *V. rosea* does not grow readily from cuttings, but seed should be sown about the beginning of January, to have fair sized plants by the beginning of May. Sow the seed thinly, and when large enough prick off into boxes. From these the seedlings may be shifted into 3-inch pots, from which they are transferred to the open ground. *V. major* is mainly propagated by cuttings. Plants rooted early in the Fall and kept growing will, in course of time, make very long growths. A good place for them in this condition of growth is on the front of a sunny bench, where the growths are allowed to hang over the side. This plant does not show the effects of neglect as quickly as most other things.



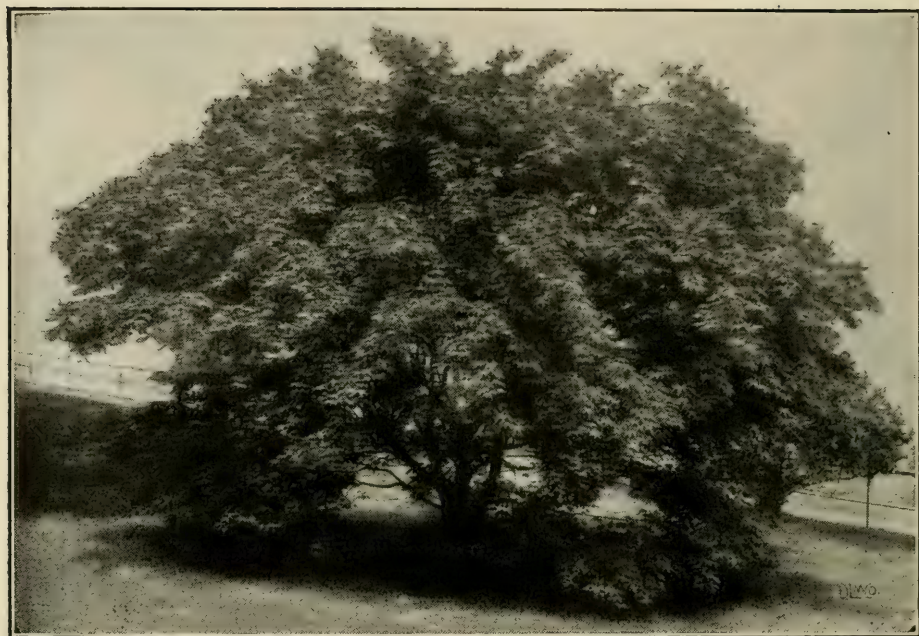
CHAPTER XI

Hardy Shrubs

ABELIA (Rock Abelia). This is one of the most pleasing and satisfactory of all flowering shrubs. It is not reliably hardy north of Washington, but for the Southern States it is equally as desirable as the Crape Myrtle (*Lagerstrœmia*). *Abelia chinensis* is one of the very best for planting in cemeteries. Where the weather is not too severe it is evergreen; grows only to a moderate height and bears white flowers in great abundance. It blooms from Midsummer till frost. The flowers are usually to be seen on the plants up to the end of November.

Propagation. It propagates freely from cuttings put in during October and November. Select them from the tips of the shoots; make them about 4 inches in length, put them close together in boxes of sand; place in the coolest house and shade from bright sunshine. By the beginning of January the batch should be gone over, as by that time many of the cuttings will have rooted. Those which have a sufficient number of roots may be put in thumb pots in the usual way, but in cases where only one or two roots appear the plants are best placed in the sides of the pots, as in that position they make roots more freely than when in the center. In a short time they will have made growth enough to be shifted into 3-inch pots, and before the time comes when the houses are crowded with Spring stock they may be transferred to the coldframe.

ACER (Japanese Maples). The species *A. palmatum*, *A. japonicum* and *A. Sieboldianum* are Japanese Maples. They have very handsomely cut leaves, and especially during Spring and early Summer they are very highly colored. The specimens usually seen are from 3 to 8 feet high. The species from which the varieties have sprung attain a height of 20 feet. All of them are very hardy, and should be planted in sunny positions so that they have freedom to develop into symmetrical specimens. They should not be planted in shade, or even partial shade, on account of losing their color early in the season.



ACER POLYMORPHUM ATROPURPUREUM

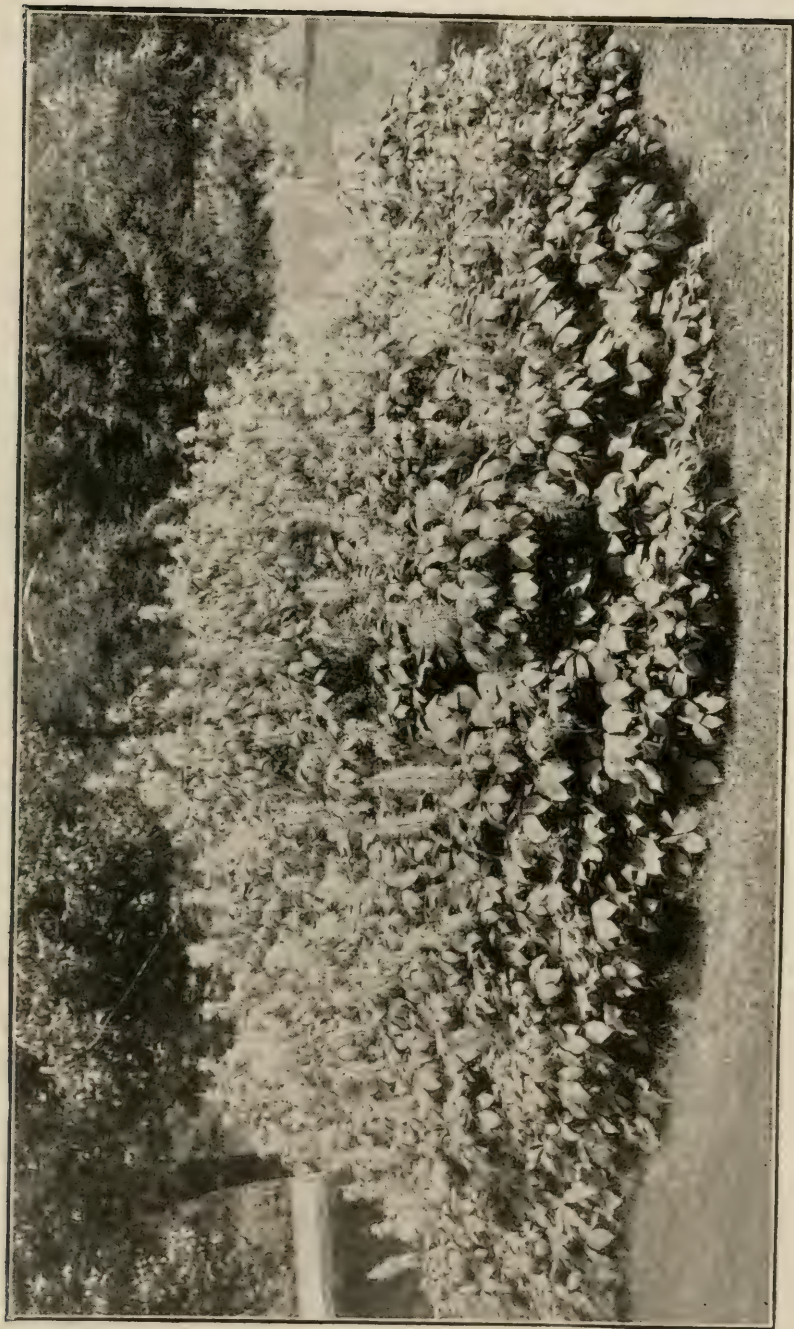
Propagation. Some of the varieties known as *A. palmatum atropurpureum*, *A. p. dissectum* and *A. p. sanguineum* set seeds freely and produce plants like the parents; these seedlings are much more vigorous than grafted plants. From old plants of *A. palmatum* seedlings are raised on which the finer varieties are grafted. Veneer grafting is the system most commonly employed.

ÆSCULUS (Pavia. Dwarf Horse Chestnut). The commonest shrubby species, *Æ. parviflora* (*macrostachya*), grows from 3 to 9 feet high, spreading rapidly by means of stoloniferous roots. It flowers in June; the flowers are white, disposed in upright racemes. *Æ. Pavia* (*rubra*) var. *purpurea* blooms in a very young state; it will succeed either in sun or shade.

Propagation. Seedlings make satisfactory blooming plants; *Æ. parviflora* is best propagated by division.

AMORPHA (Bastard Indigo). A pretty and interesting shrub. The leaves of *A. fruticosa*, the species most commonly grown, are pinnate and at a distance have a feathery appearance. The flowers, arranged in spikes, are very dark purple.

Propagation. It is propagated by seeds, also by green or hardwood cuttings.



ÆSCULUS PARVIFLORA (DWARF HORSE CHESTNUT)

ARALIA (Angelica Tree). *Aralia japonica*, (discussed under Fatsia,) *A. mandshurica* and *A. spinosa* have very large bipinnate leaves and stout, prickly stems. *A. pentaphylla*, often called *Acanthopanax*, is a dwarf shrub, with small palmate leaves and does well in shade. They are useful for permanent positions where a sub-tropical effect is desired.

Propagation. Take roots and cut them into pieces about 3 inches in length and start them during Spring, in sand or moss.

AUCUBA. A dwarf, evergreen shrub belonging to the Dogwood family. It is one of the most desirable evergreens for the warmer parts of the country. (Also discussed on p. 67.) Among the better known kinds are *A. japonica aurea*, *A. j. latimaculata*, *A. j. macrophylla*, *A. j. ovata*, *A. j. limbata* and *A. j. pygmæa sulphurea*. Some of the varieties of this plant are almost as handsome as the Crotons for decorative work, and as a berry bearing plant it has not had the attention it deserves. The sexes are on separate plants. They flower early in Spring. A branch of the staminate plant, when the pollen is in suitable condition, if carefully shaken over the pistillate flowers on a calm, sunny day, will almost certainly insure a crop of the large, bright red berries. In favorable situations the berries last in good condition through the following Winter. While frequently hurt by late frosts in this locality, it is only the imperfectly ripened ends of the previous season's shoots which suffer.

Propagation. In the Fall those shoots which are likely to be injured by frost make good material for cuttings. They may be made quite large; pieces 8 or 10 inches long will root easily in the cold propagating house. The roots emitted from the cuttings are thick and easily broken, and if left for any length of time in the sand bed, or boxes, after the roots are about 2 inches long, they are difficult to handle successfully.

AZALEA. The gardener calls all Rhododendrons which shed their leaves, Azaleas. The two earliest to bloom are *A. canadense*, the Rhodora, a rose purple sort, and *A. Vaseyi*, a pale rose with large dots in upper petals; then follows *A. nudiflora*, the Pinxter Flower, which bears flowers ranging from white to deep pink. In May and June we have the Flame Azalea, *A. calendulaceum*, with flame-colored flowers. Somewhat later, June and July, the White Swamp Honeysuckle, *A. viscosum*, is in bloom; although called white this species often has a blush tint. A group of hybrids, *A. mollis*, or the Ghent Azaleas, are in great popularity; the colors are superb.

In the greenhouse is cultivated the Indian Azalea, *A. indica*, which is discussed on page 68. Allied to the latter species is *A. amana*, a rosy purple flowering sort which is usually double.

Propagation and Culture. Most of the Azaleas have been imported from Europe, because the climate of the United States is rather too hot and labor is expensive. However, the Azaleas may be raised from seeds, cuttings, grafting and layers. The seeds are sown in a mixture of sand and peat, in the Spring. They require plenty of moisture supplied as a syringe and a good circulation of air. Cuttings should be taken about the beginning of November; at that time numerous strong shoots with small rosettes of leaves on the ends will be found above the main body of the bush. These make the best cuttings; lengths of about 4 inches will suffice. They should be inserted close together in the sand bed of a cool house. The roots which they emit are exceedingly fine. Previous to potting, if watered well before lifting, a small quantity of sand will adhere to the roots. The plants should be potted in the smallest-sized pots, using finely sifted sandy soil, with at least half of its bulk leafmold or peat.

The finer and slower growing kinds are propagated by grafting on the strong growing varieties, and also on some species of *Rhododendron*. This is done in Winter and also when the growth is ripe later in the year. Some of the strong growing forms, especially those having single white and red flowers, are, however, hardy, and for planting out they may be propagated by cuttings. Plants raised in this way have a more natural appearance than when grown as standards, in which shape they are usually imported. The cuttings should be put in the sand of a cool propagating house by the middle of August; the roots being small will need fine soil of a peaty nature for the first potting. In this operation use clean thumb pots; put the pots in water before using so as to absorb as much as possible. Instead of placing the rooted cutting in the middle of the pot put it at the side; this will facilitate rooting. At the next potting it is an easy matter to have the plant in the center of the pot. In planting out of doors it must be remembered that they will not stand drought, so they must not be left to take care of themselves. The soil should be prepared to a depth of at least 18 inches. It may consist of loam, leafmold and sand, in about equal parts. The plants should be planted moderately close together so that the foliage will keep the sun from the soil; but to insure moisture they should always be mulched during Spring and Summer, and frequently

watered during dry spells. The plants are easily transplanted in the Spring or Autumn. Deep hoeing should never be practiced, as the roots are almost certain to be injured thereby.

BERBERIS (Barberry). *B. vulgaris* is the common Barberry. It has rather ornamental yellow flowers, in May or June, followed by bright red fruits, which remain on the bush during Winter. There are numerous varieties; one named *B. v. atropurpurea* has purple-colored leaves. This is the sort which is now known to carry the wheat rust and its use is discouraged. A Japanese species, *B. Thunbergii*, grows from 3 to 6 feet high and is by far the most ornamental of the deciduous kinds. It is very symmetrical, seldom needing the aid of the knife to keep it in shape. It loses its foliage in the late Fall, but during the Winter and up till the time when the new leaves expand, the bushes usually present a very pretty appearance because of the small but very numerous fruits. Another species, *B. Wilsonæ*, is an ornamental hedge plant, succeeding in somewhat sheltered positions. *B. amurensis*, *B. Regeliana* and *B. sinensis* are also good deciduous kinds. *B. stenophylla* has small, simple leaves. *B. acuminata*, a new evergreen species, has a decidedly novel appearance. *B. (Mahonia) pinnata* thrives here only in sheltered positions. *B. (M.) japonica*, *B. (M.) nepalensis* and *B. (M.) aquifolium* are all well known evergreen shrubs, thriving in this section even in the most exposed positions. The flowers are produced early in the season, followed by handsome clusters of fruits which ripen during the latter part of May and June.

Propagation. The readiest method of increase is by seed, which should be collected when the leaves fall, gently rubbed between the hands to bruise the covering, and sown in sandy loam, in shallow boxes, making the soil firm. If placed in the cool greenhouse they will germinate uniformly, and by the end of the first year they should be over foot high.

BUDDLEIA (Butterfly Bush. Summer Lilac). Of recent years the various Buddleias have become very popular. The graceful spikes of fragrant lilac flowers are borne upon the wandlike branches serving to make the Buddleia one of the handsomest Summer blooming shrubs. The species are not quite hardy in the north, but if such species as *B. Davidii* (*variabilis*), *B. Veitchiana*, *B. japonica* and *B. intermedia* are well protected with leaves around the base of the plants, the roots will survive the Winter and send up blooming stems in the Spring.

Culture. Give them a well enriched soil and plant in the sun. Strong roots will make rampant growth and huge plants in one year.

Propagation. Buddleias produce seed which may be sown in the greenhouse in February. Summer softwood cuttings will root in the greenhouse. Hardwood cuttings may be taken in the Autumn and furnish one method of retaining stock of the Buddleias. Such hardwood cuttings must be stored in a cellar out of danger from frost.

BUXUS (Boxwood). The commonest species is *B. sempervirens*. It is a shrub used extensively for topiary work; the plants being clipped to resemble roosters, dogs, peacocks, and automobiles. There is seemingly a demand for these things. When the Boxwood is planted in suitable soil, it makes a very ornamental plant. In Europe plants only a few inches in height are very much used in bordering walks. It is always clipped about twice a year to keep it within bounds. There are narrow leaved and broad leaved forms in the United States. For shelter hedges there is nothing more desirable than this plant. The Buxus flowers very early in the season, and while the male flowers predominate over the female flowers they are seldom seen.

Propagation. When the plants get about 6 inches in height they are used for propagation. This merely consists of tearing old dwarf plants to pieces and placing them in position to border the walks. All the forms, however, are very easily raised from cuttings in a cool propagating house.

CALLICARPA. The species of this genus are grown solely on account of their beautiful fruits, which are quite small, but produced in abundance. The color of the fruit is bright violet. *C. purpurea* and *C. japonica* are the two species most worthy of cultivation. In northern latitudes the branches are apt to get winter killed, but new growths are produced, and these flower and fruit the same season. *C. japonica* is the hardiest of all the species.

Propagation. The propagation is easiest accomplished by taking cuttings of the half ripe wood and rooting them indoors.

CALYCANTHUS (Sweet Scented Shrub). Of this genus there are three well known species—*C. occidentalis*, *C. fertilis* and *C. floridus*, the latter being the most fragrant variety and the most common in gardens. There are several varieties, varying in height from 3 to 12 feet; *C. occidentalis* being the tallest and also the most tender, sometimes suffers severely in this locality. All of the species



CALYCANTHUS FLORIDUS
Courtesy Henry A. Dreer, Inc.,
Philadelphia, Pa.

are prized by some on account of the vinous fragrance of the flowers, which are dark claret in color.

Propagation. *C. occidentalis* and *C. floridus* bear seeds freely which take only a short time in germinating after being sown. The seeds may be kept in their capsules during Winter and sown in a frame during the first half of April. The seed leaves are very large, disturbing the surface soil a good deal in unfolding, therefore the seed should be sown thinly. The seedlings may be allowed to remain a year in their germinating quarters before being transplanted. Plants

are also secured by layering the branches.

CARYOPTERIS (Blue Spiræa). This is unmistakably one of the finest shrubs introduced in recent years. *C. incana* (*Mastacanthus*) was, and is, sometimes called the Blue Spiræa, but it has no relation to that genus, as it is a near relative of the Chaste Tree (*Vitex*) which is among those plants comprising the Verbenaceae family. It is one of the last shrubs to come into flower, opening out about the first half of September and lasting several weeks. The flowers are produced in fair-sized heads in the axils of the leaves on the shoots made during Summer; the color is bluish purple or white. Caryopteris has been tried for several years, and in Northern sections, owing to its being killed to the ground in Winter, should there be treated more as an herbaceous plant than as a shrub. In the latitude of Philadelphia and favorable positions farther north it has come out all right through recent Winters. In Washington bushes of it are now 6 feet high.

Propagation. The propagation can be carried on at any time during the Summer or Fall, preferably during the latter season, for which preparations should be made some time in advance by cutting back some of the stronger shoots to induce them to send out side shoots. The blind wood can be used during the flowering period.

As soon as the cuttings are ready for removal from the sand they can either be potted or boxed and stored in frames for the Winter.

CERCIS (Red Bud. Judas Tree). A species, *Cercis chinensis* (*japonica*), has lighter colored and larger flowers than either the American species, *C. canadensis*, or the European and Asiatic species, *C. siliquastrum*. Some of the original plants brought to this country from Japan are in the parks at Washington, and seldom does a season pass in which the branches are not completely hidden by the flowers.

Propagation. From seeds, layering and green cuttings started in greenhouse.

CHÆNOMELES. The common species of this genus, hardy in the North, is *C. Maulei*, a rather dwarf shrub with reddish flowers produced in great abundance, glossy leaves borne on rather procumbent, spiny branches. *C. M. superba* has the flowers of a deeper shade of red. *C. M. tricolor* has the leaves variegated with pink and white.

CHIMONANTHUS (Calycanthus præcox). The flowers of this shrub are produced on the wood of the previous year's growth long before the leaves are developed. In this locality it often blooms during the end of January. It is not reliably hardy north of Washington. The species, *C. fragrans*, and its variety *C. f. grandiflora*, are grown solely on account of the wonderful perfume emitted by the rather inconspicuous flowers. Cut in the bud state they open out well if kept indoors with the stems in water.

Propagation. It is a trifle slow to increase from cuttings of the ripened wood, doing better from the half ripe wood, with the foliage attached. Large plants are secured in a short period by layering in Midsummer.

CHIONANTHUS (Fringe Tree). The native species, *C. virginica*, of this shrub sometimes grows to a height of 30 feet; but specimens will give an abundance of bloom when only a few feet high. The flowers are disposed in drooping panicles, are pure white in color and very graceful.

Propagation. It is raised from seed and by budding on stocks of *Fraxinus ornus*.

CISTUS (Rock Rose). An erect, very handsome shrub, with large purple flowers somewhat resembling a single Rose. *C. villosus*, one of the hardier species, can be grown as far north as Washington.



CERCIS CHINENSIS (JAPONICA)

Propagation. Cuttings root freely, under cool treatment, late in Summer.

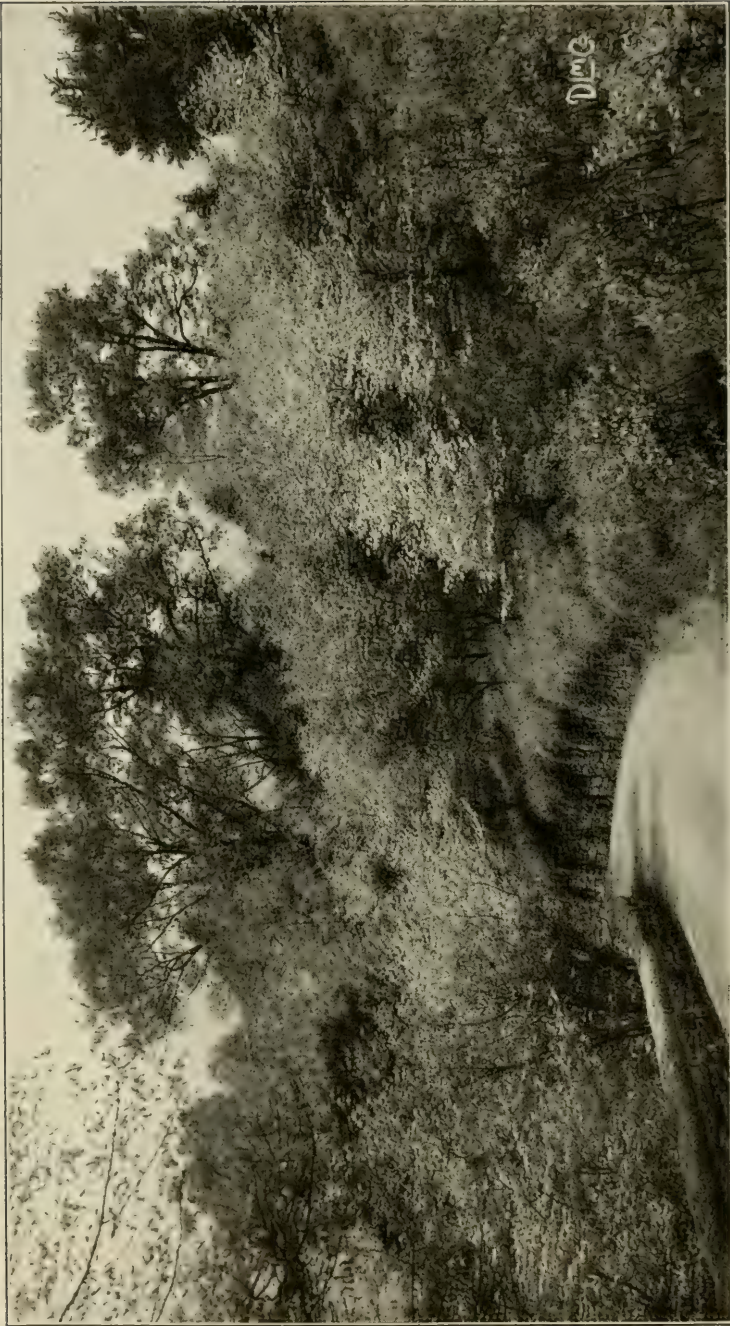
CITRUS. As a dwarfing stock *C. trifoliata* is used extensively for budding and grafting the different varieties of Oranges, and for a hedge plant, one that will make an almost impenetrable barrier, scarcely any other subject will answer so well. But its usefulness is yet by no means exhausted. As an ornamental shrub it makes quite an effective appearance early in the season, before the leaves appear, when covered with its pure white flowers, which are usually an inch across. In late Summer and Fall the branches are loaded down with its golden fruit. During some seasons this species bears two crops of flowers—the first in Spring, the second along about the month of August. The second crop of fruit fails to ripen before cool weather.

Propagation. Its propagation is effected by seeds, of which there is a plentiful supply; sown in the Fall out of doors, every seed will germinate after good weather sets in.

CLERODENDRON. A very handsome, free-flowering Japanese species, *C. trichotomum*, thoroughly hardy in the Middle Atlantic States; although annually killed to the ground farther north, it makes strong growths, and on these it blooms freely. The flowers are white with a dark red calyx. *C. fatidum* is not as hardy as the above. The crowns, if they can be saved, will flower splendidly from herbaceous stems. It is one of the best shrubs for the Southern States. It sends up many shoots from underground stems.

Propagation. Propagation is accomplished by cutting up and sprouting the roots. The plant seems to delight in rather dry soil. In dry weather, when other shrubs suffer for want of water, this one is always fresh and green; but probably this is caused by the roots going deep into the soil. To increase *C. fatidum* in quantity the roots and underground stems should be dug up, cut in small pieces, and started indoors early in Spring.

CORNUS (Dogwood). In the Southern States, *C. florida*, the Flowering Dogwood, grows sometimes 30 to 40 feet high; farther North it is a shrub 10 to 15 feet high. The flowers are small, greenish yellow; the bracts are very large and pure white. It blooms in early Spring before the leaves are developed. In Autumn a well fruited bush, with its red foliage, is a most beautiful object. *C. f. rubra* is a rosy pink flowered variety of recent introduction, well worthy of cultivation; both it and the type should be planted in



CORNUS FLORIDA

Thoughtless visitors to the woods are destroying the beauty of the flowering Dogwoods.

well-drained situations. *C. Kousa*, a Japanese species, resembling *C. florida*, is superior in prolificacy of bloom. *C. sanguinea* has dark red branches—a very effective plant among other shrubs. *C. racemosa (candidissima)*, *C. mas* and *C. alba* are commonly grown, the first for its flowers, the second principally for its fruits, while the last has striking red twigs through the Winter. *C. alternifolia* is a handsome, small tree with the branches in tiers, more or less regular.

Propagation. Seeds germinate the second year. The sorts such as *C. alba* propagate by hardwood cuttings. The varieties of *C. florida* are budded or grafted upon seedlings of the type.

COTONEASTER. A dense, low growing, evergreen shrub. *Cotoneaster microphylla* has small leaves and bright red fruits that remain on the plants the best part of Winter. *C. Simonsii* is almost evergreen and perfectly hardy south of New York; its bright red fruits are the main feature of the plant.

Propagation. They are propagated best by taking cuttings, about 6 inches long, and rooting them indoors in August or September.

CRATÆGUS (Hawthorn). There are numerous American species cultivated as shrubs, or dwarf trees, the best of which are *C. coccinea*, the scarlet fruited Thorn, and *C. crus-galli*, the Cockspur Thorn. Owing to their bright red fruits, often remaining a long time after the leaves fall, they are valuable decorative subjects. *C. oxyacantha* is the English Hawthorn. Varieties of this species make very symmetrical specimens. They are more floriferous than the American kinds. Some of the best are *C. o. alba-plena*, double white; *C. o. punicea-plena*, double scarlet; *C. o. bicolor*, pink, edged with white; *C. o. rosea*, pink with white claw. *C. pyracantha* is the Evergreen Thorn. The fruits are the principal decorative feature of this shrub; they are of a beautiful scarlet color, remaining on the branches during Winter. *C. p. Lelandi* has bright, orange-scarlet fruit—a very ornamental and quick-growing variety.

Propagation. They are increased by budding or grafting upon seedlings of the type. The seeds do not germinate until the second year from sowing, consequently they should be mulched in Summer to prevent drying out.

CRYPTOMERIA (Japan Cedar). With us this is one of the most satisfactory of the evergreen coniferæ. It looks well in a 5-inch pot, and from that to a specimen 30 feet high. It varies very



CRYPTOMERIA JAPONICA

much, there being nearly a dozen well defined varieties. In the New England States it is not thoroughly at home as a tree, and this condition is not to be met with until we get as far South as Maryland. As a pot grown plant *C. japonica* is very little inferior to the costly Norfolk Island Pine (*Araucaria excelsa*) and it can be gotten up in quantity at less than one-tenth the cost of the latter.

Propagation. Cuttings root well if put in by the end of October, in a cool sand bed. They can be inserted large enough so that by the middle of May following they will be ready to be shifted into 5-inch pots. Although plants raised from cuttings make the best furnished plants for using in pots, seedlings, if grown on without a check, furnish plants within a year from sowing, which will not look too small in 5-inch pots. The seed should be gathered as soon as ripe, which is usually about October 15, else there is danger of it being lost through the cones bursting open, the seed falling out through a little disturbance of the branches. For sowing, prepare shallow boxes of firmly pressed soil—loam, leafmold and sand in equal proportions will suit. Sow the seed, not too thickly, and cover with half an inch of screened leaf soil and sand; put near the glass in a temperate house. They will germinate the first half of January, and can remain in the boxes, if not sown too thickly, until the end of May. Pot off singly or three in a 3-inch pot at first, using sandy soil. Keep in a growing temperature until they are too large for small pots. The plants will stand in coldframes during the Winter in most places without harm, other than a slightly yellowish tinge to the leaves, but where they are wanted to make marketable plants in as short a time as possible from the seedling stage, they should be kept in a cool house where, if suitable rooting conditions are provided, they will make rapid progress during the Winter months.

CYDONIA (Japanese Quince). These plants are among our most desirable hardy shrubs, coming into bloom along with Forsythia and *Jasminum nudiflorum*. This plant is now frequently classed as a *Chænomeles*. There is a form with variegated leaves and pale flowers, also a pure white and double red. All varieties are very susceptible to scale.

Propagation. The common form will give good flowering specimens from seed. The finer varieties may be grafted on seedlings of the type. Cuttings of the ripe wood taken in the Fall and stored till Spring are rooted successfully. It is also raised from cuttings of the roots, from suckers and by layering.

DABÆCIA. The White Irish Heath, *Dabæcia cantabrica*, is a neglected dwarf shrub; it should be planted more largely because it sends up its rather large, pure white flowers in great profusion and will repay efforts to cultivate it in a cool house. It needs peat and plenty of it mixed with silver sand. At Washington it blooms in a cool house the year round. It is a most charming plant.

Propagation. It is very easy to propagate from cuttings placed in a cool house almost any time of the year. It may also be propagated by seeds sown in a mixture of peat, loam and sand.

DAPHNE. Few species of this fragrant flowering genus are hardy in Northern latitudes. *Daphne Cneorum* is a hardy, dwarf, evergreen trailing shrub growing not more than a foot high. It flowers in April and May; the color is dull pink. It makes a neat symmetrical plant, with very sweet scented flowers. It is often injured by the cold because it vegetates so early. *D. Blagayana* is also a desirable hardy trailing species, not so well known as the above. *D. Mezereum*, a hardy deciduous species, is sometimes used for forcing, more on account of the fragrant flowers than for their appearance. *D. odora*, *D. o. marginata* and *D. o. alba* make very satisfactory growth in sheltered positions out of doors here, but it may be stated that the plants were imported direct from Japan. Greenhouse grown plants have been tried in similar situations with unfavorable results. *D. odora* is grown indoors and is discussed on p. 109. *D. pontica* and *D. Laureola* are perfectly hardy in Washington, but they do best with partial shade in Summer. The last named is scentless.

Propagation. *D. Cneorum* is rather slow to increase from cuttings. The best method of propagation is to layer the trailing branches in Spring, making an incision, or tongue, in the under part of the stem. Have the cut part at least 2 inches under the soil; secure with wooden pegs; press the soil firmly over it, and cover with sphagnum to insure moisture. Leave until the following Spring before separating from the parent plant. *D. Mezereum* is raised from seed, and its forms grafted on seedlings of the type.

DEUTZIA. The Deutzias are all valuable because of their showy flowers. A free growing and handsome flowered species, *D. scabra*, often grows 8 feet tall and bears white or blush flowers on short growths made on the previous season's wood. *D. s. crenata* is a form with smoother leaves than the type. There are several other varieties with double flowers more or less tinged with rose. *D. c.* Pride of Rochester has the flowers large and double white.

In the Northern States they should be planted in protected situations. These plants make splendid growth in tubs, and are easily forced into bloom for the decoration of large conservatories. *D. gracilis* has never been known to suffer from cold weather in this latitude, and it is said to stand the Winter, when in sheltered positions, in the Northern States. As it blooms on short growths made on the wood of the previous season, the plant would be of no service where its branches are apt to get winter killed. It is one of the grandest of our dwarf flowering shrubs, blooming in Washington from the first to the middle of May, and growing from 2 to 3 feet high. It is well suited for planting in cemeteries. For forcing into bloom, it is an easy subject. The plants may be lifted from the open ground as late as the weather will permit. They lift with a mass of fine fibrous roots, and should be potted before getting a chance to dry. Place them in a deep frame till wanted; put them in heat very gradually, else there will be a tendency to have flowers without foliage. *D. Lemoinei*, a hybrid between *D. gracilis* and *D. parviflora*, is also a good subject for forcing and is more vigorous than *D. gracilis*.

Propagation. These shrubs are easily propagated from green wood cuttings taken shortly after the plant is done blooming. Dull weather should be chosen for the operation, as then the cuttings stand an almost certain chance of rooting. Make the pieces about 4 inches long; avoid the thick, succulent growths, taking only those which have most substance to them. Put closely together in the sand bed of a cool house, or frame, and shade to prevent wilting. As soon as rooted, put in boxes or small pots until roots start in the soil, then plant in rows outside, where they will make bushy little plants before Autumn. The next year after that in which they are struck from cuttings will give plants large enough to go into 6-inch pots for forcing. They are easily propagated also by hardwood cuttings taken after the leaves fall from the current year's growths; they should be tied in bunches and heeled in moss in a coldframe. In early Spring they are put in boxes of sand, with a little soil at the bottom, and kept in a greenhouse. When rooted they are hardened off and planted out in rows, where they will make fair sized plants before the growing season is over. They may also be propagated from seed.

DIERVILLA (Weigela). *D. rosea* is the best known of the species; it blooms in May and June. As it is not particular as to soil or location the species and its varieties should be in every col-

ection. *D. r. floribunda* has dark red flowers with whitish stamens—a very prolific bloomer. *D. r. Desboisii* has deep rose colored flowers. *D. grandiflora* is a tall growing plant with large leaves and flowers. There are several varieties with white, red and pink flowers; some of these give scattering blooms throughout the Summer and Autumn months. *D. rosea* and its forms force very easily.

Propagation. In its propagation, cuttings of the dormant wood root quickly if put in gentle heat about the end of March, or the growing tips may be used in Summer when kept in a humid atmosphere during the rooting process.

ELÆAGNUS. There are several species of this genus which are widely planted. Among the best of these are *E. argentea*, which grows over 10 feet in height and produces very fragrant, small flowers; *E. angustifolia* (*hortensis*), 15 to 20 feet, and has silvery white branches; *E. pungens* var. *Simoni*, an evergreen species of great value, hardy near New York City. *E. multiflora* (*longipes*) has edible fruits known as Gumi Berries.

Propagation. They are increased from seeds; the variegated forms are propagated from cuttings placed in the sand of a cool house in Autumn.

ERICA (Heath). These are attractive, low growing shrubs useful for bordering those of taller growth. *Erica vagans*, the Cornish Heath, is an early kind, as is also *E. mediterranea*; *E. cinerea* and *E. tetralix* are later in blooming. *Calluna vulgaris* (Heather), with the double and white flowered kinds, are all good; they need peaty soil, or loam mixed with an abundance of leafmold and sand, and should not be allowed to get dust dry at the roots while in a young state.

Propagation. The cuttings taken from the tips of the current year's growth should be put in during late Summer. Few florists have just the proper facilities for rooting these and kindred plants. The structure, a cool frame, should face north and will be all the better if in the shade of a house. The idea is to have the atmosphere while rooting as moist and as cool as possible.

EUONYMUS (Spindle Tree). Up till within a few years *E. japonicus* was among the finest of our evergreen shrubs in this section, but owing to the ravages of a small scale insect the plant is now comparatively seldom seen and will only thrive where severe measures are taken to keep it clear of the pest. Several forms have very handsome variegations; their names are: *E. j. latifolius-aureus*,

E. j. aureo-marginatus, *E. j. albo-marginatus* and *E. j. latifolius-albus*. They bloom about the end of July and usually ripen large quantities of seeds. *E. radicans variegata*, also an evergreen, is usually best known in its place in the shrubbery, but it is extensively used for a very different purpose, and that is as a carpet bedder; especially valuable for this purpose is the variety *vegeta*. For this work, to fill even a small space, a great many plants are necessary. In public parks and gardens the same plants may be used several seasons, or the growing points may be rooted afresh each Fall.

There are several interesting deciduous sorts, namely, *E. alata*, the Winged Spindle Tree with corky winged branches; *E. americana*, the Strawberry Bush, so named because of its pinkish fruits; *E. europæa*, which becomes almost a tree; and *E. atropurpurea*, the Burning Bush, with the winged scarlet fruits.

Propagation. The sorts are readily propagated from seeds or from ripened wood taken in the Fall. With *E. radicans* the shoots are collected in bundles of 50 or 100 together, and with a strong knife they are cut to a uniform length of 4 or 5 inches. The lower leaves are stripped and the cuttings put very thickly together in boxes of sand, and placed in a cool frame, where they root freely.

EXOCHORDA (Pearl Bush). The only fault with Exochorda is their short blooming season, which is during the month of May, but they are exceedingly handsome while they last. *E. racemosa (grandiflora)* is the commonest species and although sent out in the early seventies it is still by no means common, owing to its propagation by the usual methods being somewhat difficult.

Propagation. In several localities it has ripened quantities of seed for several years, and when seed is obtainable no difficulty is experienced in raising plants, as the seeds germinate very evenly. Severe pruning, such as this plant is likely to get from cultivators, on account of the desirable sprays for cut flowers, evidently works against the setting of seed, for the specimens which have borne abundant crops of seeds in this locality are those which have never been touched by the knife. This plant was sent out under the name of *Spiræa grandiflora*, which clings to it yet in some places.

FORSYTHIA (Golden Bell). Japanese shrubs, usually covered with bright yellow flowers very early in Spring. There are two well known kinds in cultivation. *F. suspensa* has long, drooping branches, while *F. viridissima* is more erect in growth. Both kinds flower before the leaves make their appearance, a day or two of warm sunshine being sufficient to bring them out. The plants should

be pruned only after they are done flowering, as the flowers are produced directly on the wood made the preceding Summer.

Propagation. No shrubs are easier to increase. All that is necessary is to cut the previous season's growths into lengths of 8 or 10 inches and heel them in deeply in a protected piece of ground, covering during hard weather with leaves or loose litter. November is the month for this operation. The cuttings will also root in a very short time, if put in moderate heat in March.

GORDONIA (Loblolly Bay). These plants thrive in the District of Columbia when given a deep, sandy soil and well supplied with moisture. They produce their large, Camellia like flowers from July till frost. *G. alata* (*pubescens*) and *G. Lasianthus* are the species grown. The last named has pure white flowers, about 4 inches in diameter.

Propagation. They are propagated by layering, allowing the layers to be well rooted before removing.

HALESIA (Snowdrop Tree). These shrubs, or small trees, are in full flower before the leaves are fully developed. In this section *H. Meehani* forms a very symmetrical, small sized tree, *H. diptera* and *H. carolina (tetraptera)* differ from each other in the number of wings to the fruit.

Propagation. All of the kinds are raised from seeds, which sometimes remain in the ground over a year before germinating. Seedlings of *H. carolina* are used as stocks for the beautiful flowered Japanese *Styrax*.

HIBISCUS (Shrubby Althæa. Rose of Sharon). A deciduous shrub of easy culture, *H. syriacus*, needs very little attention after being planted beyond an occasional thinning out of the branches. Most of the numerous varieties are very neat and compact, growing from 5 to 12 feet in height. They bloom late in the season when most of the other shrubs are out of flower. *H. s. totus-albus* is a useful single white variety and flowers when very small. *H. s. camelliaeflorus* is double white, with pink throat. *H. s. Boule de Feñ*, double, violet colored flowers. Other good double-flowered forms are *H. s. Leopoldii flore pleno*, *H. s. rubra pleno*, *H. s. purpurea flore pleno* and *H. s. Jeanne d'Arc*.

Propagation. The double flowered varieties root easily from cuttings of the dormant wood, in early Spring, or from green wood in Summer. The cuttings from the ripened wood should be made

in the Fall and heeled in out of the reach of frost in moderately dry sand. They may be put in rows in the open as soon as weather permits, or they may be rooted indoors early and planted out later. Several of the single varieties come true from seed, of which an abundant crop is usually produced.

HYDRANGEA. There are three species of garden Hydrangeas. *H. opuloides*, which includes the *H. hortensis*, is divided into three groups, namely, the Japonica, the Hortensia, and the Stellata. There are many varieties in this group, all of which cannot withstand a temperature of less than 20 degrees F., except by very careful protection. Some are cut to the ground during Winter in the latitude of Washington, D. C., but they never get injured permanently. *H. o. Lindleyana* and *H. o. stellata prolifera* usually survive the Winter with the stems several feet above ground. These plants form very large specimens, and are very handsome when in bloom, changing in color, as the flowers mature, from greenish white to a deep rose. The central flowers are fertile, the outer ones sterile. *H. o. japonica* has one or two very handsomely variegated forms. Cuttings of these are apt to lose their leaves in the sand bed, but in this condition they will root, making young growths simultaneously with the rooting process; and if they are carefully put in very small pots they will make fair sized plants within a year. But they must be kept in pots during this time, as the roots are much weaker than those of the green leaved plants. The variety known as *H. o. aurea-variegata* is probably the handsomest of our hardy plants. *H. o. Otaksa* has large heads of rose colored flowers. *H. o. ramulis-coccineis* has dark colored stems and pink flowers. *H. o. Thomas Hogg* has pure white flowers. Cuttings will root any time after the shoots are moderately firm. Where wood is scarce the large stems may be split down the middle with a leaf to each piece. Where pruning is necessary it should be done early in the season, to throw vigor into the shoots springing from the base of the plant. (See page 130 for indoor culture of this group.)

H. paniculata grandiflora is one of the best of the late blooming shrubs. The flowers are creamy white, in large, pyramidal heads, terminating the current year's growths. It comes into bloom, according to locality, from July to September. It is grown both in bush and standard form. The plants should be severely cut back in the early Spring. *H. arborescens*, and its form Hills of Snow, are well known Hydranges which bloom in June and are daintier and more dwarf than *H. paniculata*.



HYDRANGEA PANICULATA GRANDIFLORA

H. quercifolia, the Oak-leaved Hydrangea, from the Southern States, opens its large pyramidal heads of flowers late in the season and is valuable on that account alone; but the handsome foliage and its spreading, graceful habit combined make it a most desirable shrub. It will thrive either in partial shade or full sun.

Propagation. Green cuttings may be taken during the first part of July. Select a dull day for the operation. Take those shoots which are not too robust and only the ends; shorten back the leaves one-third and put in sand, in a cool, humid atmosphere. Cuttings of the dormant wood may be made 8 or 10 inches long and inserted, either in the Fall, or kept heeled in, or buried in a cold-frame during Winter, putting them in rows in the open as soon as weather will permit. Cover thinly with spent hops, or old manure, in either case.

In propagating *H. quercifolia*, the smallest of the ripened shoots should be taken with the leaves attached, placing the stems deep in the sand bed of the cool propagating house. If put in about the middle of October, most of them will root by the end of February. Suckers, with small roots attached, may be lifted and potted in Spring. The most certain method is to layer the lower branches, allowing them to remain at least a year before removing. Seeds are not always obtainable, but they germinate readily in sandy soil covered with finely screened sphagnum moss.

HYPERICUM (St. John's Wort). *H. Kalmianum* is the species most commonly seen in cultivation; it thrives in almost any soil and in a sunny position. *H. patulum*, a Japanese species, forms a bush from 4 to 6 feet in height, in favorable situations. *H. Moserianum* is not so tall as *H. patulum*, but the flowers are larger; both of them are apt to be hurt in Winter in exposed situations. *H. calycinum* is one of the handsomest and most useful of the dwarf evergreen shrubs. It forms dense clumps of growths, not over a foot high, with very large, bright, orange yellow flowers; much used for the front portions of shrubberies. In parts of the country where the Winters are too severe it is easily protected by branches of evergreens, or rough stable litter.

Propagation. Most sorts root readily from Summer cuttings; the creeping sorts such as *H. calycinum* increase easily by division. Seeds also grow readily.

ILEX (Holly). *I. Aquifolium*, the English Holly, is, unfortunately, tender in the Northern States. Philadelphia is said to be the northern limit of its hardiness. Around Washington it is per-

flectly hardy, but it is much shorter lived than our native species, *I. opaca*. Except with comparatively small specimens of the English species on which the fruit is in larger clusters and brighter colored, the native one is to be preferred for specimen plants. Several specimens in the parks here are over 40 feet high, and not much inferior as berry bearing plants to the English one. *I. opaca* is very common in a wild state in the woods here. They are generally found in the shade of other trees, conditions which make them scraggy looking. When grown in the open, in prepared ground, their appearance is quite altered; the branches grow close together, and the outline of the tree is rather conical, not spreading as in *I. Aquifolium*. There is a variety of *I. Aquifolium* with yellow fruit which is desirable. There are also many kinds with curiously formed leaves, not so popular here as they are in Europe. *Ilex Aquifolium* flowers on the growths of the preceding Summer; *I. opaca* flowers later, and on the current year's wood.

I. cornuta, from China, is a very satisfactory species, but the berries, of which there is a plentiful supply, do not ripen until after the time when they would be most welcome. It would be an interesting experiment were some of our Southern woodsmen to plant the Chinese Holly (*I. cornuta*) for the sake of its berried branches as a Christmas Holly along with the English (*I. Aquifolium*) and the native evergreen kinds, *I. opaca* and *I. Cassine*. The last named is the prettiest of the three, but both berries and leaves are small; the berries shrivel up too quickly and sometimes fall off before they can be used. *I. cornuta* fruits more freely than any of the other species. In the vicinity of Washington, by the middle of December, the berries are only beginning to turn red. Whether this fault would appear where the flowers expand earlier in the season it cannot be said. A most noticeable feature in connection with the Japanese plant, the mentioning of which may be of use to some one some day, is that it bears a much more abundant crop of berries when male plants of the English species are in the immediate neighborhood. The hardiness of this plant is about the same as that of the English kinds, probably a little more tender. It can be grown as far north as Philadelphia. In Washington it stands the most severe Winters without hurt, and grows much stronger than the English species. In transplanting the evergreen Hollies the leaves should be removed.

Propagation. The English species takes well on stocks of *I. opaca*. The operation should be done indoors either before growth

is active in Spring, or after the wood is fairly ripe in August. *I. opaca* is more difficult to raise from seed than *I. Aquifolium*. The outer covering of the seeds of Holly is quite hard, and often they do not germinate the same season as sown. If sown as soon as ripe, in very sandy soil, and care taken to keep them from drying out during the dry months of Summer, they will germinate the following Spring. Sow the seed rather deep and cover with a mulching in Winter, which covering is easily removed when freezing weather is past. A good method is to sow in a mixture of peat and sphagnum moss, made quite firm, and place in a greenhouse where it will get the full sun, keeping the mixture moderately wet. Plants grown for their berries, or, in fact, for any purpose except for hedges, should never be selected from seedlings, as there are two kinds, one with the female organs, imperfectly developed, but with the stamens well formed bearing abundance of pollen; they are the most abundant bloomers, but do not bear fruit. The other kind has fewer flowers, with the pistils all well formed and quite prominent in the center of the flower. The stamens on the other hand seem imperfect in most cases, but doubtless there is enough pollen on them to fertilize the flower, as fruiting plants set seed all right a long distance away from the pistillate plants. Therefore, cions should always be selected from berry bearing plants. *I. cornuta*, grown in company with varieties of the English species, does not come true from seed.

ITEA (Virginian Willow). The cultivated form of *Itea virginica* is much superior to plants found in the wild state. It has long racemes of rather pretty greenish white flowers. It usually grows from 2 to 4 feet high, and is a denizen of low, wet places. The Autumn color is a handsome red.

Propagation. It may be propagated by division, or by seeds which ripen freely.

JASMINUM (Jasmine). *J. nudiflorum* may be used either as a bush plant on the lawn or open border, for covering walls or arbors, or for forming a light hedge. It is not particular as to soil or situation, growing almost anywhere. Its flowers are produced during mild Winters. Beginning in December, they expand as the weather permits till April. It is not hardy north of Washington and is used principally as a greenhouse plant. *J. humile* (*revolutum*), *J. fruticans* and *J. floridum*, all of them yellow flowered species, usually stand the Winters here. *J. humile* is the hardiest.

Propagation. Effected by putting in cuttings of the ripe growths out of doors in Autumn. Good-sized branches can be layered successfully.

JUNIPERUS (Juniper). *J. sabina* var. *tamariscifolia* is a most useful dwarf, trailing evergreen, seldom growing over 18 inches high. *J. procumbens* is another species of creeping habit.

Propagation. Cuttings may be put in after the first slight frost. Where only a limited number of this and other evergreen coniferous shrubs is required, the best method, is to fix up a few boxes, say about 4 inches deep, with sandy potting soil at the bottoms and pure sand on top; make the cuttings about 6 inches long, half of which should be in the soil. Put them in fairly close together, and firm well. Give one good watering. Stand the boxes in the coolest part of the house under the benches; keep moderately damp, and by Spring, if the conditions have not been unfavorable, a goodly percentage will have rooted. If not too close together they will take little harm from passing the Summer in the same boxes. The kinds available for this method of propagation are Biotas, Cupressus, Thuja, Retinispora, Cephalotaxus and Taxus.

KALMIA (American Laurel). The Mountain Laurel, *Kalmia latifolia* is a native evergreen shrub growing from Maine southward. In the Northern States it is a bush, 4 to 8 feet high. Farther south it is frequently met with 20 feet high. It blooms during May and June. It is cultivated much in the same way as Rhododendrons; but under cultivation we seldom see the plants flourishing equal to those in their native habitats. *K. polifolia* (glauca) has lilac-colored flowers, and whitish under the leaves; *K. angustifolia* has purple flowers. All three are used for forcing, imported plants being employed for the purpose. *K. angustifolia* has lateral corymbs; in *K. latifolia* and *K. polifolia* they are terminal. Manure of any kind should not be used in the cultivation of these plants.

Propagation. Raised from seeds sown in peaty soil or from half-ripe wood cuttings and layers.

KERRIA (Corchorus). *Kerria japonica* is a popular flowering shrub which is not too particular as to soil or situation. It attains a height of about 6 feet. There are three forms—double, known as the Globe-flower, and single flowered and variegated. They are all good. The variegated one keeps the color in the leaves all through the season just as showy as in Spring; it usually bears a crop of flowers, which are bright yellow, over an inch in diameter,



KALMIA LATIFOLIA (MOUNTAIN LAUREL)

along about the first part of May. This plant is capable of being used as a hedge subject, as it stands clipping well. The other two kinds are more profuse bloomers, especially the double, which is the strongest growing of the three. It is seldom without flowers all during the Summer and Fall. It has a charming Winter effect because of its green branches.

Propagation. The plants are best propagated from ripe growths during the latter part of August, indoors.

KÆLREUTERIA. One of the very best small sized deciduous trees in cultivation, *K. paniculata* is such a tree as florists are often called upon to suggest for small gardens and in places unsuitable or too small for the development of forest trees. The Kælreuteria was certainly not named by anyone having its popularity in view; the long name is responsible for the plant not being more common. There is not a generally popular name under which the species is known, the commonest name being the Varnish Tree. The leaves are compound; the flowers yellow, in immense panicles, well above the leaves; they are produced in June and July.

Propagation. The seed, which is somewhat like that of the Canna, if sown in the Fall will germinate the following Spring. Stock is also got up readily from root cuttings.

LABURNUM. *L. alpinum*, the Scotch Laburnum, is the hardest species. Where it does well it is a most beautiful shrub or small tree. The flowers are bright yellow, in long racemes. *L. anagyroides*, Golden Chain, bears racemes of bright yellow flowers 8 inches long in the Spring.

Propagation. Seeds sown in May, or grafting upon seedlings are the commoner methods of propagation.

LAGERSTRÆMIA (Crape Myrtle). Northern nurserymen, as a rule, do not handle this plant, owing to its being tender in the North. However, it is hardy enough to stand zero weather; but when the mercury gets much lower the plant is apt to be killed to the ground. In the Southern States the Crape Myrtle is perhaps the best known of all the flowering shrubs, as there are few, if any, which exceed in beauty a well developed specimen in full bloom. The flowers of *L. indica* are bright pink and are arranged in immense heads, even on one-year-old plants from seed. Large specimens grown in tubs, and kept in a cool greenhouse, can be made to flower two or three times during the year by cutting back the flowering branches. *L. i. alba* has pure white flowers, others are bright and pale shades of purple, rose and red. It is hardy in this

section and is successfully grown much farther north with a slight protection during Winter, for if the roots are protected with a covering of leaves, or rough litter, they will sprout vigorously and bloom profusely before the Summer passes.

Propagation. It is best propagated from seed, as all the colors come true. Sow in boxes about the latter part of September, on very firm soil, covering the seeds with finely sifted, peaty soil. They will germinate in Spring, and if liberally treated some of them will bloom the same season.

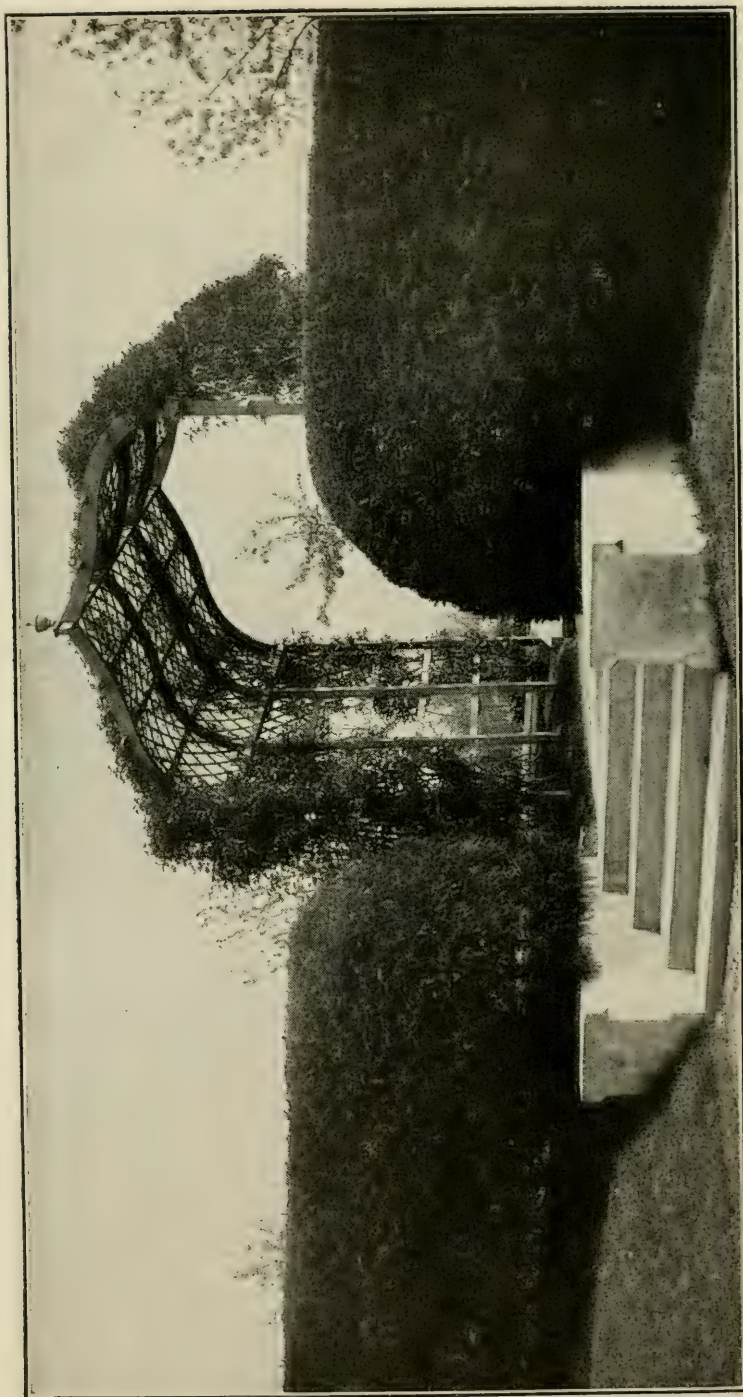
LAURUS (Bay Tree). In sheltered situations *L. nobilis* occasionally survives the Winters in this section. It sometimes makes growths 6 feet long in a single season; these are necessarily soft and ill prepared to stand severe weather. Large specimen plants grown as standards and pyramids are imported for decorative purposes. They may be had in good condition for several years by attention to watering and keeping them indoors when there is danger from frost. Owing to their restricted root room there is little danger of their growing out of shape.

Propagation. Cuttings may be made of well ripened wood placed in a closed propagating frame. Seeds are often used.

LIGUSTRUM (Privet). In the District of Columbia *L. japonicum* is a very desirable evergreen species with large leaves. During very severe Winters the outer branches suffer considerably. *L. ibota*, especially *L. i.* var. *Regelianum*, and *L. lucidum* are very attractive looking shrubs when in flower. *L. ovalifolium* is the so-called California Privet; much used as a hedge plant. The European privet, *L. vulgare*, has small flowers and foliage. *L. vulgare*, *L. amurense* and *L. ibota* are the hardiest of the species. There is a form of *L. vulgare* with glaucous leaves, the margins of which are bordered with white.

Propagation. The deciduous species are among the easiest shrubs to root from dormant cuttings. These may be put in as soon as the leaves fall. The usual practice is to make cuttings about 10 inches long, tie in bundles and bury in sand, putting the cuttings in rows in the open ground in early Spring. The evergreen species usually bear large quantities of seeds, which are slow in germinating; when they remain in the ground over Summer a mulching should be given to prevent drying.

LONICERA (Bush Honeysuckle). The bush Honeysuckles furnish a group of most attractive shrubs because of their ease of



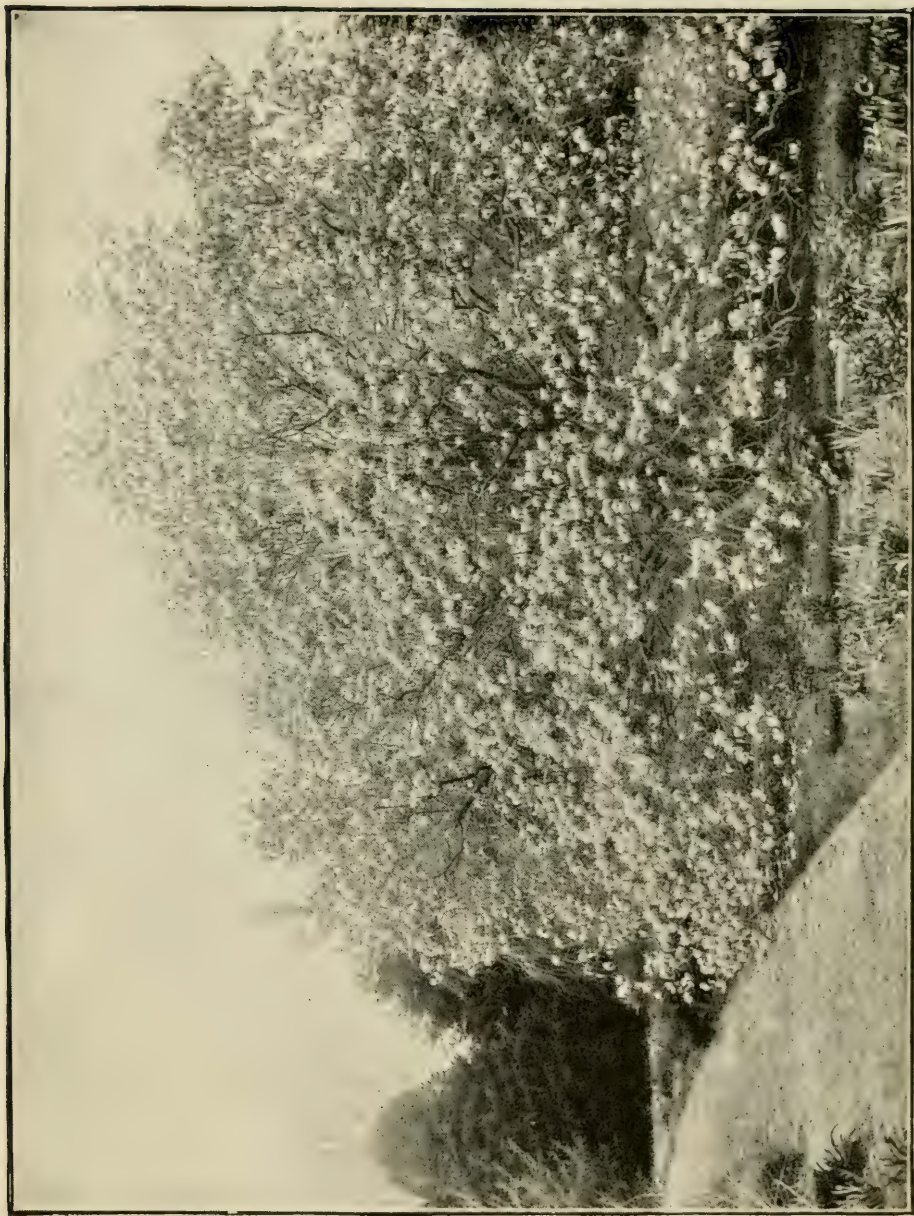
PRIVET HEDGE AND CLEMATIS ARBOR

culture, prolificacy of flowers, which are white, yellow, pink, scarlet and even purple, and besides many sorts produce very attractive berries. *L. Standishii*, a half evergreen blush white flowering sort, and *L. fragrantissima*, both bloom as early as March, the flowers being very fragrant but inconspicuous. *L. Morrowii* and *L. Ruprechtiana* are both valuable on account of their handsome red fruit which ripens in great abundance. Most *Loniceras* enjoy the sun, but are grown in almost any situation, however; *L. Xylosteum* is good in partially shaded situations. *L. Albertii* is a dwarf species with small and narrow glaucous leaves and purplish flowers useful for rockeries.

Propagation. Seeds sown in September will germinate the following Spring. The branches may be layered any time after mid-Summer. They may be propagated by cuttings taken any time during a wet spell in Summer, and rooted indoors. After this process they may be heeled in boxes of soil, and afterward either planted in rows outside or kept in a frame till Spring; or hardwood cuttings may be taken in Winter.

MAGNOLIA. All of the hardy species, some of which are fair-sized trees, are well worth growing. They may be divided into two sections—North American and Asiatic. Those of the former produce their flowers after the leaves are formed, while the deciduous, Asiatic species bloom for the most part on the naked wood, and very early in Spring. *M. grandiflora*, an evergreen species, native of the Southern States, begins blooming here about the end of May and continues throughout the Summer. In the region of Washington it is hardy, but during Winter, when the thermometer registers from 5 to 10 degrees below zero, the leaves are almost certain to fall, although without apparent injury to the plant. North of here it has a struggle for existence. Seeds sown in Autumn usually germinate in Spring. Seedlings are more vigorous than grafted plants, but they nevertheless take a considerable time before attaining a flowering size. *M. macrophylla*, another native, is known as the Great-leaved Magnolia; it is much hardier than *M. grandiflora*. The leaves are from 2 to 3 feet long, and proportionately broad. The flowers are nearly a foot across. It is easily raised from seed. In this locality its blooming period is during the last half of May and early in June. *M. glauca*, *M. Thomsoniana* and *M. Watsoni* are all desirable hardy shrubs. The two last named have larger flowers than the type.

Among the Chinese and Japanese species and varieties, *M. stellata* is the earliest to come in bloom; it is sometimes in full flower



MAGNOLIA SOULANGEANA

This is the commonest of our Spring flowering Magnolias

here by the middle of March. *M. denudata* (*conspicua*) follows a week or ten days later; this is the finest of the Chinese species. As the large flowers expand before the foliage it is indeed a conspicuous plant when in bloom. *M. Soulangeana* is thought to be a natural hybrid between *M. denudata* and the dark purple flowered *M. liliflora* (*obovata*). This is probably the case, as the color of the flowers would indicate; moreover, it is later in blooming than *M. denudata* and earlier than *M. liliflora*. *M. Kobus* is a very shapely small tree, with small flowers which open early. It is used as a stock for grafting purposes. The seeds are certain to germinate evenly when sown as soon as ripe. *M. Soulangeana* var. *Lennei* is the showiest of the dark purple flowered kinds. The bloom is cup-shaped and very large; the petals are dark purple on the outside, lighter within. *M. stellata* is sometimes used as an Easter plant. When flowered in pots for this purpose it should be home grown, and plants selected for forcing which show the most buds. For forcing they may be potted in the Fall, but if the ground is in a condition to allow the plants to be lifted they can be successfully flowered a week or two afterward.

Propagation. Effected by seed, budding, grafting, and layering. Stocks may be chosen from *M. Kobus*, *M. tripetala* or *M. acuminata*. Layering should be practiced before the plants are in active growth. The best season for planting is just before the plants start into growth.

NEVIUSIA (*Alabama Snow Wreath*). The common name of *N. alabamensis* is a little misleading, as when in flower there is really nothing to suggest snow from the appearance of the bushes. The stamens are the most attractive part of the flower; they are greenish white. The flower is really a *Spiræa* without petals.

Propagation. By division of the old plants; they sucker very freely. Summer cuttings can be depended on to root quickly.

OSMANTHUS. This genus belongs to the same order as the Olive (*Olea*), under which the species are sometimes described. *O. aquifolium* has a certain resemblance to the English Holly (*Ilex*). The resemblance is still more striking in the variety *O. a. ilicifolius*, one of the handsomest evergreen shrubs outside of the Conifers. It has stood outdoors here for a long number of years. During very severe Winters it suffers very little, and in protected situations not at all. *O. a. myrtifolius* is a form with leathery, spineless leaves, but is not such a free-growing shrub as the others. Of *O. a. ilicifolius*

there are one or two handsome variegated forms in cultivation, but they are less hardy than the green leaved variety.

Propagation. They are easily propagated by cuttings, rooted indoors during the Fall months. *O. a. ilicifolius* seeds freely and the seedlings come true; they do not germinate till the second year. Privet stocks are used on which to graft the variegated forms.

PÆONIA (Shrubby Pæonia). The shrubby Pæonies are varieties of *P. Moutan*. They are hardy in the North, but their flower buds are quickly developed during mild weather, consequently they are apt to suffer from late frosts. They force well early in the season, but are only good for variety, as few flowers can be had on a moderate sized plant. As border subjects they are desirable, making an attractive display during April or the first half of May.

Propagation. By seeds, division and grafting. The single and semi-double forms will, in favorable seasons, ripen a considerable quantity of seed; they should not be allowed to remain in the seed vessels after they are ripe, as they harden, and germination will take longer than if sown when ripe. Sow in boxes and keep under cover for the Winter. They should germinate in Spring. Seedlings are not as free flowering as grafted plants. The operation of grafting is best performed during the first half of September, in order that the union may be perfect and new roots produced by the stocks to give the Spring growth a vigorous start. For stocks any of the numerous varieties of the Chinese species may be taken; those varieties having the poorest flowers should, of course, be selected for the purpose. The wood taken for cions should be from the less robust part of the plant, that in which the large flower buds are absent being preferred. The leaves should be shortened back, and the cion attached to a good sized piece of the fleshy part of the root of the herbaceous species by the easiest of the ordinary methods of grafting. Tie on with a string which will not rot in the ground during Winter, as support is needed in this way even after the cion has taken with the stock. The position to be occupied by the grafted stocks is the most important part of the operation.

Where the Winters are severe, a deep frame, facing north, is the best place for them. In this locality they are heeled in on a sheltered part of the open border, but deep enough in the soil, so that the lower part of the cion is covered. A layer of decayed leaves or sphagnum is kept on the surface of the soil, and the tops shaded for the first two weeks. In planting insert deep enough so as to give the cions every opportunity to send out their own roots. About the

beginning of May the graft will have made considerable growth; each one should then be supported with a stick, else it is liable to become detached from the stocks. Division should only be attempted with plants which are well provided with short growths from the bases of the plants.

PAULOWNIA (Empress Tree). Under favorable conditions *P. tomentosa (imperialis)* grows into a good-sized tree. During May, before the leaves appear, the large panicles of bright purple, gloxinia like flowers open out, making a most gorgeous appearance. A medium sized tree will ripen an almost incredible number of seeds; they are quite small and need careful tending to germinate them successfully. Young plants, when cut down annually, throw up very strong shoots with leaves sometimes 2 feet in diameter, giving an effect not to be had with any other plant. It thrives in any soil. It is hardy in the North, but the flower buds, being naked, are usually killed by severe frosts.

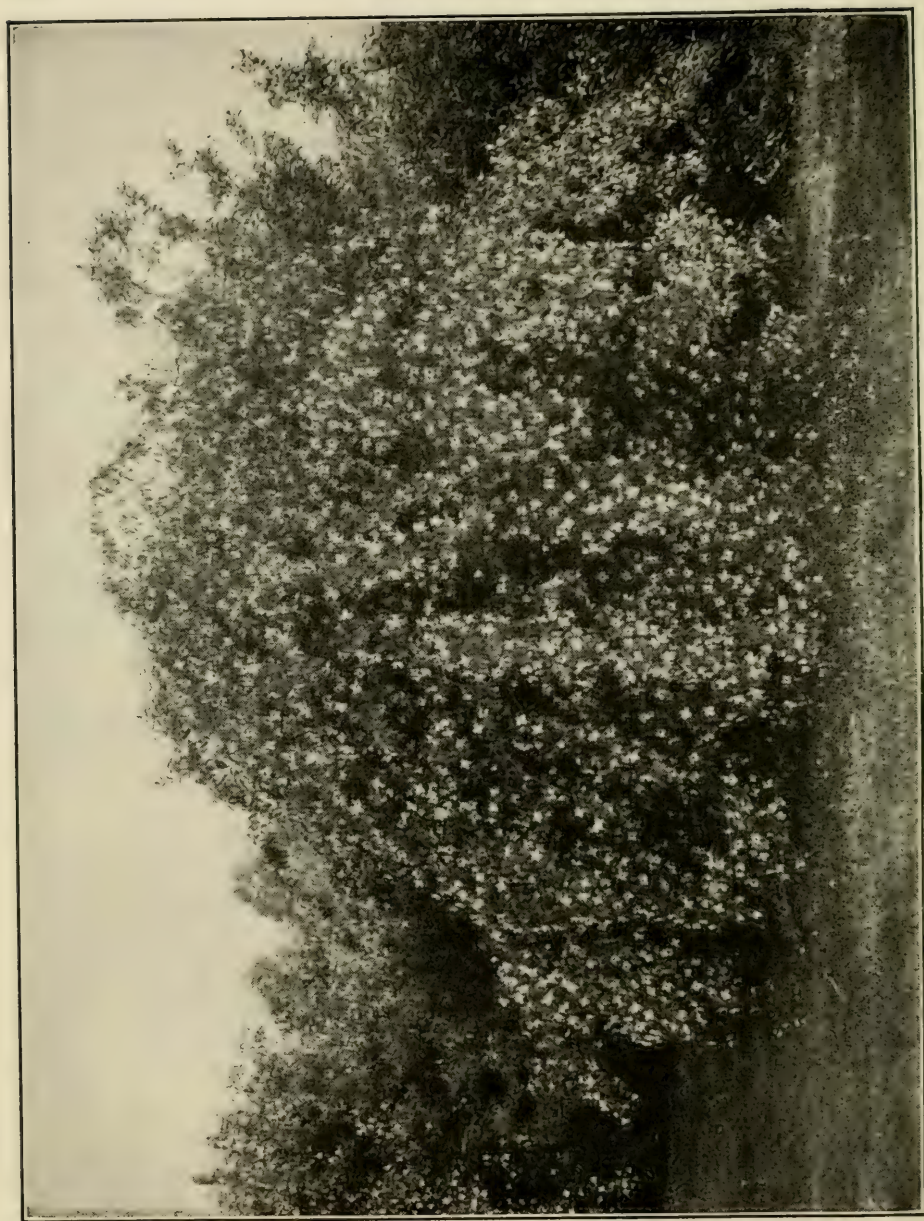
PHILADELPHUS (Mock Orange. Syringa). All of the species and their forms are valuable flowering shrubs with large white flowers, some of which are very fragrant. *P. coronarius* is one of the best known; *P. c. primulæflorus* has double flowers; there is another, *P. c. foliis aureis*, with yellowish leaves. *P. grandiflorus* is a native of the Southern States; it has larger flowers than *P. coronarius*. *P. Lewisii* is a late bloomer, with almost scentless flowers. Pruning should be done only after the flowers have faded. This will give the young wood an opportunity to ripen. The flowers are only produced on the wood made the preceding Summer. They succeed in almost any soil.

Propagation. Cuttings taken after the leaves drop in Autumn will root very quickly if put in slight bottom heat in March or April; or in a protected place they root well in the open ground.

POTENTILLA (Shrubby Cinquefoil). *P. fruticosa* is a very hardy species growing from 2 to 5 feet high, with pinnate leaves and numerous bright yellow flowers, which are produced all through the Summer. Small plants are very suitable for the rockery, and by pruning in the Spring they are easily kept within bounds.

Propagation. Cuttings may be rooted at any time indoors during Summer.

PRUNUS (Plum. Cherry. Almond. Peach). The genus *Prunus* includes many species of stone fruits of which some are of ornamental value. The Cherry Laurel or English Laurel (*P. Lauro-*



PHILADELPHUS CORONARIUS

cerasus) is hardy from Washington south. It is not native of England, but of the Levant. The Bird Cherry, *P. Padus*, bears long racemes of white flowers in May, followed by ornamental black fruit. *P. spinosa flore-pleno*, the double flowering Sloe, forms a large shrub, usually covered with double white flowers in early Spring. The dwarf white, double-flowering Almond is *P. japonica flore-alba-plena*; the red form is *P. j. flore-rubra-plena*. They bloom for only a short period, but are exceedingly handsome while the flowers last. *P. Pissardi* is the Purple-leaved Plum, of which there are good and bad forms; the good varieties retain their coloring till the end of the season. The flowers, usually borne in great profusion, open in early Spring before the leaves expand.

The double flowering forms of *P. vulgaris*, the Flowering Peach, are among the most popular of dwarf-flowering trees. Their period of blooming is during April and May, according to locality. *P. v. versicolor plena* has the flowers either red or white on the same tree, or with both colors combined in the same flower. There are double red, double rose and double white forms. *P. amygdalus* var. *nana* is the Flowering Almond and is a most attractive double pink flowering shrub.

Propagation. The Plums and Cherries may be propagated by layers or cuttings, preferably the latter, as they will root in pretty large pieces—over a foot in length. The rarer varieties should be grafted on stocks of the type. Cuttings will succeed any time after the wood is ripe; a piece of the wood of the preceding year attached will give all the better results. *P. Mazzard* is usually employed for budding *P. cerasus Sieboldi rosea plena* (Japanese Weeping Cherry) and *P. c. sinensis plena* (Chinese Double-flowering Cherry). For weeping sorts use two buds and for the other sorts one bud to make the heads. *P. amygdalus* var. *nana* is successfully increased by cuttings of the large roots, made in Autumn and stored in damp moss. It may be budded to good effect at a height of 3 feet upon the stock, the Plum being used extensively.

PTELEA (Hop Tree). This small tree, *Ptelea trifoliata*, is grown for the attractive, wafer like fruits and handsome, three-parted foliage. The name Hop Tree is applied to this tree because the parts of the tree when bruised emit a pungent odor of hops.

Propagation. Seeds may be sown in the Autumn. The variety, *P. trifoliata aurea*, is grafted on the type.

PUNICA (Pomegranate). Both the tall growing and dwarf Pomegranates, *Punica granatum* and *g. nana*, stand the most severe

Winters in Washington without the least injury, and flower quite profusely during the Summer. They are all the more welcome, as their unique, bright scarlet flowers are produced when shrubs in bloom are scarce. In favorable seasons they ripen fruit, but we do not depend upon these for propagation. The dwarf form makes a very ornamental shrub and should be tried wherever it is likely to thrive. Native of Cabul and Persia.

Propagation. Cuttings are taken from one- and two-year-old wood, stored and put in a cool house propagating bed about the middle of February; they root very evenly. They should be removed to a frame as soon as they will bear it.

PYRUS (Crab Apple). Highly ornamental, low growing trees usually covered with flowers early in Spring. Some of them have very highly colored fruits in Autumn. The flowers of *P. coronaria* are large, single, pinkish white, very sweetly-scented. It bears fruit freely, but the seedlings are slow in making flowering plants. *P. floribunda* and the variety called *atrosanguinea* are most beautiful when the flowers are half expanded; they are then of a bright, rosy red color, getting lighter when fully open. The flowers of *P. Parkmanni* are double, of a beautiful deep rose; valuable for cutting. It is a very free flowering variety and should be largely grown. *P. carnea* and *P. lutea* produce large numbers of flowers on small grafted plants. The double white and double coral colored forms of *P. spectabilis* are very desirable; they are very regular bloomers, seldom missing a season. *P. floribunda* and *P. f. atrosanguinea* bloom freely in a small state, and should be grown more for forcing purposes.

Propagation. They are increased by budding and grafting on seedling stocks.

RAPHIOLEPIS. The common species, *R. umbellata*, is a charming little evergreen shrub, which is hardy in Washington in sheltered situations. The flowers resemble those of a *Cratægus* they are pure white, sweet scented, about three-quarters of an inch across and arranged in terminal panicles. The leaves are leathery in texture and oval. It ought to prove a good shrub for the Southern States.

Propagation. It is easily propagated by cuttings in the Fall, rooted indoors.

RHODODENDRON. In some parts these do grandly. In this locality, when given sheltered and partly shaded positions, they

thrive tolerably well, but when in the full sun they do not thrive unless very carefully watched, nor do they thrive in a limestone soil. Hybrids of *R. ponticum* are less hardy than those of *R. catawbiense*. This species and *R. maximum* are natives of the Eastern States; they should be given treatment similar to that recommended for Azalea. *R. punctatum*, a species from North Carolina with small pink flowers is quite hardy North. R. W. Curtis recommends the following varieties: *R. album elegans*, large, white, early June; *R. Mrs. C. S. Sargent*, pink, early June; *R. Caractacus*, red, early June; *R. Everestianum*, lavender, early; *purpureum elegans*, purple, early June.

Propagation. They are increased by layering and grafting on seedling stocks of hardy species, principally *R. maximum*.

RHODOTYPOS (White Kerria). The common species, *R. kerrioides*, is a very desirable Japanese shrub, seldom growing over 8 feet high, although in its native country it is said to reach twice that height. The flowers make their appearance as soon as the growths of the current year develop, and keep up quite a display from about the middle of May all through the Summer and Fall months; that is, if the ground does not get too dry. The flowers are snow-white, about 2 inches in diameter, and appear at the ends of the shoots. The plant thrives well on heavy soils, and, although not necessarily, in places crowded and partly shaded by overhead foliage.

Propagation. The seeds are in shape and size somewhat like those of the Kerria. They may be sown as soon as gathered, as they are slow in germinating; frequently seedlings start at the base of old plants.

RHUS (Sumach). These trees and shrubs have the interesting character of turning brilliant hues in the Autumn. *R. Cotinus*, the Smoke Tree, is covered during Midsummer with a fringe like growth of seed vessels and pedicels. *R. glabra*, the Smooth Sumach, is one of the handsomest species, on account of its large, odd-pinnate leaves. *R. g. laciniata* has the leaflets much cut up, resembling the fronds of some Ferns. *R. typhina*, the Staghorn Sumach, grows from 10 to 30 feet high. The leaves are odd-pinnate, having from 11 to 31 leaflets. *R. copallina*, the Shining Sumach, is a shrub, growing from 1 to 7 feet high and is attractive because of its glossy leaves. *R. Toxicodendron* and *R. vernix* are poisonous species; the former is known as Poison Oak and Poison Ivy, the latter as Poison Sumach, Poison Elder and Poison Dogwood.



RHUS COTINUS (SMOKE BUSH)

Propagation. Most species propagate readily from seeds or suckers from roots.

ROBINIA (Locust). The Rose Acacia, *R. hispida*, is a most attractive shrub, bearing deep, rose colored flowers in hanging racemes. When grown on its own roots it suckers freely, and when planted among choice shrubs it soon appropriates space not intended for it. When worked on stocks of the False Acacia, *R. Pseudacacia* it is a more desirable shrub, but it requires frequent pruning to keep it in shape. Of *R. Pseudacacia* there are low growing and late-blooming forms; none of them are, however, superior to the type.

Propagation. Seeds, suckers, and grafting upon seedlings of *R. Pseudacacia* are the best methods of increase.

SHEPHERDIA (Buffalo Berry). Under favorable conditions *S. argentea* grows into a small tree. The leaves, owing to the presence of an immense number of small silvery scales, are almost white on both sides, and from a distance the plants look as if they were covered with white flowers. The blooms are small, produced singly or in pairs in the axils of the leaves; they are exceedingly fragrant. *S. canadensis* is a smaller species, reaching a height of 6 feet.

Propagation. Both are easily raised from seeds.

SPIRÆA. The shrubby species worth growing are too numerous to mention here. One of the earliest to flower, and a favorite kind, is *S. prunifolia*; *S. cantoniensis* (*Reevesiana*) and its double form are both popular. *S. Thunbergii* blooms very early in the season when there are but few leaves on the plant; the flowers are small, but they make up in numbers for what they lack in size. In the Northern states the tips of the branches are often winter-killed. All of the above have white flowers. *S. salicifolia* and its varieties bloom in dense panicles late in the season. This, with *S. paniculata rosea*, another late bloomer, has pink flowers. *S. Van Houttei* is one of the best kinds which flower in May or June; it makes a good forcing plant. *S. Bumalda*, *S. B. Anthony Waterer* and *S. B. Froebelii*, taller than Anthony Waterer have the flowers disposed on the ends of the shoots of the current year's growths, in flat heads, several inches in diameter. In *S. Bumalda* the flowers are rose colored; its variety has dark crimson blossoms. Both are dwarf, but very vigorous and easily propagated from the young wood. *S. sorbifolia*, *S. grandiflora* and *S. Lindleyana* are distinct from the others in having odd-pinnate leaves and the flowers arranged in large panicles, produced late in the season; they are properly Sor-

barias. *S. sorbifolia* dies down to the ground each season, and during extra hard Winters the other two behave in a similar way; but they make growth enough the following Summer to flower. *S. Lindleyana* is useful for planting in large groups. A native of the Himalayas it is probably unsuited for Northern sections unless well protected.

Propagation. Most sorts are easily raised from seeds, hard or softwood cuttings and by division.

STAPHYLEA (Bladder Nut). *S. colchica*, *S. Bumalda* and *S. trifoliata* are grown chiefly for their inflated pods and white flowers. *S. colchica* has fairly large sized racemes of almost pure white flowers, very agreeably scented.

Propagation. Young plants with flowering wood can be grown in two years by taking cuttings of dormant wood in Autumn, heeling in moss, introducing them to gentle bottom heat in March.

STYRAX (Storax). A very ornamental and hardy deciduous species, *S. japonica*, has pure white flowers very abundantly produced in June and July. This species makes a good lawn plant.

Propagation. By seeds which are sown as soon as ripe; the cuttings do not root very readily.

SYMPHORICARPOS. *S. albus (racemosus)*, the Snowberry, is grown on account of the large white fruits which hang from the ends of the branches during the Autumn and Winter months. *S. orbiculatus (vulgaris)*, the Indian Currant, or Coral Berry, has red fruits smaller than the latter species.

Propagation. Seeds, divisions, as well as hard and softwood cuttings readily multiply the plants.

SYRINGA (Lilac). There are numerous species of Lilacs in cultivation, some of which are valuable for cut bloom. They are handsome while in flower, but they do not pay to grow alongside of the varieties of the common species, *S. vulgaris*. Of these there is an abundance to choose from. *S. chinensis (S. rothomagensis)*, a small leaved kind, is valuable on account of the long stems which support the flower heads. *S. persica*, the Persian Lilac, and *S. p. laciniata* make rather handsome bushes, which is more than can be said of most of the kinds, as they are decidedly unsightly when out of bloom compared with the majority of ornamental shrubs. They are all natives of the Old World. *S. vulgaris* is indigenous to central Europe. Some of the finer varieties are as follows: Miss Ellen Willmot and Marie Legeraye, both large-flowered and pure



STYRAX JAPONICA—FLOWERS WHITE

white forms; Louis Van Houtte, dark red; Dr. Lindley, purplish lilac; Charles X., reddish purple; Leon Simon, double, bluish crimson; Emile Lemoine, double, rosy-lilac.

Propagation. Lilacs may be increased by seeds, suckers, layering, cuttings from half-ripe or dormant wood, budding and grafting. Raising plants from seeds is practiced for producing new varieties and for supplying stocks. The best stock is the California Privet, *Ligustrum ovalifolium*. By this method suckering is prevented. Layering is a sure method, and when a limited number of plants is wanted, it is the one which should be practiced.

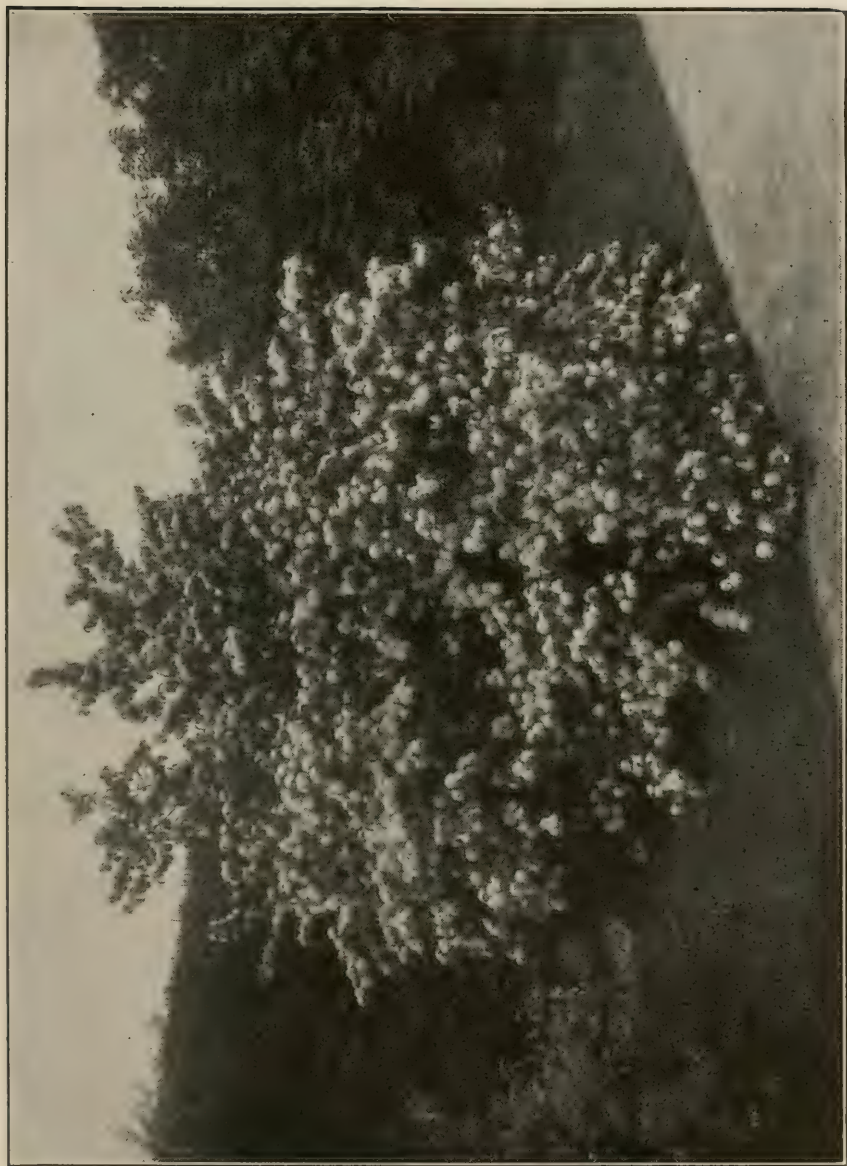
TAMARIX (Tamarisk). The Tamarisks are graceful, airy shrubs which succeed admirably at the seaside where soil is apt to be salt.

Propagation. All of the species give little trouble in their propagation. If cuttings 6 inches long be made from the previous year's wood and put in gentle heat in the early Spring, they will root in a few days. Outdoor propagation will require the cuttings to be made nearly a foot long.

ULEX (Whin. Gorse. Furze). *U. europæus* is a beautiful shrub which frequently gets winter-killed with us, yet we would not think of doing without it. It is useful for planting in the front of a shrubbery, in sunny places. It starts into active growth very early in the season, and late frosts do more injury than the very severe frosts of mid-Winter, although, like many other things, it does not like rapid thawing and freezing during Winter.

Propagation. Seedlings are easily raised, and with good treatment they will bloom when two years old.

VIBURNUM (Snowball). Owing to their large and showy heads of sterile flowers, several of the kinds are much grown in shrubberies, in groups on lawns, and for cutting. *V. opulus sterilis* is the one most largely cultivated; it comes in earlier than the Japanese species, *V. plicatum*, which is the best for cutting, as the flowers last longer, having more substance to them. *V. macrocephalum*, as the name implies, has large heads of flowers; in fact, too large to be of much service in cutting. This form is shy in rooting from cuttings, and is usually worked on seedlings of any of the free growing species. There are numerous species, but their flowers are not showy. *V. reticulatum* has very handsome foliage, and forms a neat, tall bush. *V. Tinus* is an evergreen species, frequently getting injured here during Winter; there are several desirable forms of it.



VIBURNUM PLICATUM (JAPANESE SNOWBALL)

V. dentatum, the Arrow Wood, is an attractive native shrub with coarsely toothed leaves and bluish black fruits. *V. Carlesii* is a most attractive species with pink and white flowers opening early in the Spring. For naturalizing there are several native sorts: *V. alnifolium*, *V. acerifolium*, *V. prunifolium*, *V. cassinoides* and *V. Lentago*.

Propagation. Seeds sown in Spring after stratifying during Winter. When propagated from cuttings the growing tips should be taken in Summer; this must be done during a wet spell or from bushes which have been kept watered, otherwise the cuttings are very apt to lose their leaves during the process. Many of the sorts may also be propagated by hardwood cuttings.

VITEX (Chaste Tree). In the region of Washington, *V. Agnus-castus* is one of the best late blooming shrubs, surviving the Winter without protection; farther north it needs protection and a sheltered situation. The flowers are purplish blue or white. The plant blooms in August and September. *V. cannabæfolia* forms large, wide bushes, but it suffers during very severe weather. Both species are best raised from seeds. There is a hybrid form between the two species, with *V. Agnus-castus* as the seed parent; it is equally as hardy as that species, and comes true from seed.

XANTHOCERAS. A native of Northern China, *X. sorbifolia*, was first grown in Europe about 40 years ago. It flowers after reaching a height of about 18 inches. Adult specimens, it is said, reach a height of 20 feet. The flowers are arranged singly, on a central stalk, which is several inches long. The stalk is upright, the bottom flowers opening first. In general appearance the individual flowers have a striking resemblance to those of the *Shortia galacifolia*. They have the same crumpled appearance on first opening. The outward parts of the petals are pure white, and nearest the base the color is at first yellowish green, subsequently streaked with brownish red and eventually changing to a brighter red. The flower stalks are produced on the ends of the previous season's wood; flowers and foliage expand together. In appearance the foliage somewhat resembles that of the Mountain Ash. The fruit is quite large, fully the size of a Horse Chestnut. The seeds are brownish black, three-quarters of an inch in diameter.

Propagation. The seed should be sown as soon as ripe and kept cool so as not to force germination until the middle of April. To insure the best results each seed should be sown singly in a 3-inch pot. This does away with the possibility of injuring the tender roots in transferring to larger receptacles or to nursery rows. From



XANTHOCERAS SORBIFOLIA

some cause many of the seeds produce plants which are entirely white instead of green; these die when a few weeks old.

YUCCA (Adam's Needle). The hardy species of this genus are all ornamental plants thriving in situations fully exposed to the sun. Almost any soil will suit them. Some of the most useful species are *Y. gloriosa* (of which there are numerous varieties), *Y. recurvifolia*, *Y. angustifolia*, *Y. filamentosa* and *Y. flaccida*. The commonest species grown in the North is *Y. flaccida*, rather than *Y. filamentosa*, has stiffer leaves and coarser, curlier threads on the leaves.

Propagation. They are increased by dividing the stems and planting in a shaded spot until rooted; also, in some species, by seeds, and from root cuttings.



Chapter XII

Roses

ROSA (Rose). The Rose is without question the most popular of flowers, and it can hardly be wondered at, as in the very numerous species and varieties we have nearly every shade of color in the flower—green, yellow, bronze, red, pink, white, purple and almost black. The flowers, be they single, semi-double or double, have much to please the eye, and their fragrance is unsurpassed. The cultivated varieties are divided into classes. Some of the varieties are differently arranged by different authorities. The arrangements are intended as aids to the published descriptions; thus the more easily do growers get an idea as to the habits of a new Rose when the originators class it with a section of the better known varieties. But the varieties of the several groups have, to a certain extent, been crossed one with another, and there are very few people, even be they expert rosarians, who agree with each other on the position which some of our Roses should occupy in any system of classification. Again, as new breaks are made by the crossing of the species and varieties, as has lately been done with the species *R. Wichuraiana* and *R. rubiginosa*, there arises a necessity for new class names. Some of the sections are but little grown in the Northern States, as the plants which do best in the colder parts of the country belong to only a few classes.

Hybrid Perpetuals and Hybrid Teas. The following distinctions can usually be made between the Hybrid Perpetual and Hybrid Tea Roses:

Hybrid Perpetual—Name a misnomer for they are not perpetually blooming. Hardy, will stand much cold. More double flowers than most Hybrid Teas. Fatter buds. Flatter blooms. Not tea scented.

Hybrid Teas—Many varieties are very perpetual blooming. Will stand cold only when protected. Less double than most Hybrid Perpetuals. Pointed buds. Much bronze color in stems and foliage. Strongly tea scented. Lovelier colors than Hybrid Perpetuals.



ROSE FRAU KARL DRUSCHKI

HYBRID PERPETUALS

The Hybrid Perpetuals are the best known garden Roses, but they are often less satisfactory than the Hybrid Teas because they become unsightly after blooming. In many cases the blooms appear in June, a trifle earlier or later, according to locality, and if not given best care will stop blooming. By cutting the blooms properly and with good culture some of the kinds give a few scattering blooms in Autumn.

Some of the Hardest and Best Hybrid Perpetuals

- Frau Karl Druschki. Pearly white. Best Hybrid Perpetual; real thick buds; prune moderately. The largest white Rose.
 Margaret Dickson. White, flesh center. Blush Frau Karl Druschki.
 Gen. Jacqueminot. Very deep crimson. An old but standard red.
 Prince Camille de Rohan. Very deep crimson. Good bloomer; hardy; vigorous growth; more double than Gen. Jacqueminot.
 J. B. Clark. Crimson, shaded rose. Vigorous; good for garden and cut flowers.
 Ulrich Brunner. Deep rose. Prolific; perpetual flowering; vigorous; good fragrance; long stems; disease resistant.
 Paul Neyron. Pink. Largest flowering of Roses; rather coarse; extremely vigorous.
 American Beauty. Crimson. Often not so good out of doors.
 Magna Charta. Rosy pink. Bold, though somewhat dwarf.
 Mrs. John Laing. Rosy pink. Minute dots on petals; good height.
 Mrs. R. G. Sharman-Crawford. Rosy pink. Vigorous; fragrant; hardy; large.
 Louis Van Houtte. Deep red. Moisture turns buds black; fragrant; protect; free from mildew; dwarf; prune well.
 Clio. Rose pink. Most vigorous.
 Anne de Diesbach. Brilliant pink. Hardy; almost thornless.
 Alfred Colomb. Brilliant red. Large flowers; quite globular; fragrant; good grower.
 Madame Gabriel Luizet. Light pink.

Forcing Hybrid Perpetuals. Before forcing Hybrid Perpetuals the plants should be lifted when the growths are matured, pruned back, potted firmly and placed in a coldframe. Plunge the pot among leaves, if there is a probability of their making a few roots before freezing weather without the buds starting into growth. Plunging will keep the roots safe and in a condition ready for active work. When brought into a cool house in the early part of the year, they need to be brought on very gradually so as to have feeding roots when the buds break. An examination of the roots will show when it is safe to force growth by giving gentle heat.

The American Beauty, sent out as such in 1885, is a perpetual bloomer and has, to a certain extent, taken the place of most of the older forcing varieties of the so-called Hybrid Perpetual class. This variety, which was raised in France, has had a wonderful career as a forcing Rose in the United States, and it is unlikely that its place will be taken by newcomers for some time at least. American Beauty, when cultivated under glass, is an ever bloomer. It is grown in a slightly warmer atmosphere than the Teas, and is often very successfully cultivated in solid beds. Medium sized wood should be chosen for the cuttings, and these made with two eyes. They should be planted out of 4-inch pots.

TEAS AND HYBRID TEAS FOR THE GREENHOUSE

This group is the most important of all the Roses, because it includes the Roses most grown under glass to supply flowers all the year round. The three Killarneys—the Pink, White and Killarney Brilliant, the latter being a brilliant rose red—are standards. The popularity of any one variety of red Rose is much contested, some growers preferring Hadley, others Hoosier Beauty, Richmond or Mrs. Harry Winnett. Ophelia, an orange salmon colored variety, has taken the market by storm; it is mildew proof, but occasionally is affected by black spot; the foliage, stem, and finish of the flower are superb. Madam Butterfly is a deeper colored sport. The largest pink Rose is Premier, perhaps, a rival of American Beauty. Columbia and Mrs. Charles W. Russell should also be mentioned as much grown pink Roses; the latter is the deeper in color. Mrs. George Shawyer has proved a most exquisite Rose for many growers; it bears bright peach pink buds upon long stems; is a bit susceptible to mildew. Two apricot Roses are grown: Sunburst and Mrs. Aaron Ward; perhaps the former is the better in size of flower, length of stem and prolificacy, but Mrs. Aaron Ward is an excellent corsage Rose because of its smaller buds and shorter stems.

My Maryland, a pink; Kaiserin Augusta Victoria, a lemony white; Francis Scott Key, a crimson; Radiance, a superb pink; together with Ophelia, Mrs. Charles Russell and the Killarneys, are used for Summer blooming indoors.

Three miniature Roses are popular at present for use in corsages, namely, Mlle. Cecile Brunner, also called Mignon and Sweetheart, this is a tiny pink variety almost indispensable for retail store work; Georges Elgar, a yellow polyantha, and Bon Silene, an old variety with bright pink, round buds.



ROSE COLUMBIA

Awarded its originator, E. G. Hill, in 1920, the Gertrude M. Hubbard Gold Medal as the best Rose of American origination to date



ROSE LOS ANGELES

Cultivation Under Glass. Teas and Hybrid Teas are the Roses most largely grown for this purpose. They are easiest propagated from cuttings of the half-ripened wood. It does not seem to make much difference whether flowering or blind wood is used. Cuttings may be taken to single eyes with the leaf shortened back, or made with two eyes and the lower leaf removed. A bottom heat of from 65 to 70 degrees will answer, the atmosphere of the house being 10 degrees lower. Propagation is carried on from January to March. The plants are put out on the benches during June, from 3- or 4-inch pots, according to variety. Four inches of soil is the usual quantity; the kind used should be rather heavy and fibrous loam mixed with rotted cow manure to about one-sixth of its bulk. Subsequent mulchings of rotted manure mixed with bonemeal are given as the plants show the necessity for them. Abundance of ventilation is afforded during warm weather. If shading is necessary it should be done with a substance which is easily removed, such as grafting clay mixed with water and applied with a syringe or pump. Firing should begin when the outside temperature drops to 50 degrees; the minimum night temperature of the house should be kept in the neighborhood of 58 degrees, rising to 70 degrees during the day for the Teas and Hybrid Teas. Watering is an item of the first importance. The condition of the soil is the best indicator as to whether water should be given or withheld. The first buds are cut off to induce robust growth. Syringing is necessary to prevent red spider from increasing but should only be practiced in bright weather. Ventilation is not less important than watering, and good judgment must be exercised in opening and closing the house; the condition of the weather out of doors must always be taken into consideration, as well as the indoor temperature, as cold draughts, or the temperature getting too low will almost certainly provide correct conditions for an attack of mildew—a fungus which in a short period, if allowed to grow unchecked, will ruin the plants. When mildew makes its appearance, sulphur applied to the steam or hot water pipes is the best antidote. Aphides are best checked by vaporizing tobacco extracts.

Some of the Best Hybrid Teas for the Garden

Antoine Rivoire. Rosy flesh on yellow. Good grower; large; in pruning thin out and shorten shoots.

Bessie Brown. Creamy white. Fragrant; prolific; vigorous; large-flowering.



ROSE HOOSIER BEAUTY

- Madam Caroline Testout. Silver pink. Fragrant; continuous bloomer; quite hardy; thorny.
- Kaiserin Augusta Victoria. Lemon white. Continuous blooming; fragrant; good form; the best white Hybrid Tea.
- La France. Silvery pink, paler reflex. First Hybrid Tea grown.
- Gruss an Teplitz. Brightest red of Roses. Best and easiest to grow of reds; prolific and continuous blooming.
- Sunburst. Salmon yellow. Good stems; large flowers; continuous blooming.
- Los Angeles. Lustrous pink, with a salmon cast. Excellent stems.
- Lady Alice Stanley. Lovely pink. Good stems; large flowers.
- Lieutenant Chauré. Velvety crimson red. Fine bud; vigorous grower; free-flowering.
- Jonkheer J. L. Mock. Clear pink, two shades. Superb; strong stems; prolific.
- Etoile de France. Crimson, center cerise. Cupped form; large; vigorous; prolific.
- Madam Abel Chatenay. Salmon shade rose. Good for cutting; good size; do not prune heavily.
- Mrs. Charles Russell. Deep rose pink. A rather new Rose worthy of attention.
- Madam Ravary. Golden yellow. Large, globular; prune hard.
- Konigin Carola. Silvery rose. Upright growth; vigorous.
- Ophelia. Pearly salmon pink. Excellent foliage; superb bloom.
- Laurent Carle. Carmine. Vigorous; hardy; fragrant.

TEA ROSES

The planting of many Teas, except *Hermosa*, is not advised; they are too tender and require so much care that they should only be grown after one is truly a Rose enthusiast and will give them good attention.

- Maman Cochet. Pink. Most hardy of Teas; profuse blooming; beautiful bud; growth low.
- White Maman Cochet. White, somewhat tinged yellow. As good as Maman Cochet.
- Clothilde Soupert. White, creamy tinge. Good as an Autumn Rose; small flower; producing all Summer.
- Mrs. George Shawyer. Lovely pink. Seems to be an excellent bedder.
- Hermosa*. Delicate light pink. This is one of the hardiest of the China Roses. It blooms from June until frost continuously.
- Madame Joseph Schwartz. Pink.
- Helen Gould. Red. Good finish.
- Souvenir de Pierre Notting. Yellow, suffused apricot.
- Sombrueil. White. In many locations superior to white Maman Cochet.

RUGOSA HYBRIDS

Among the other everblooming kinds the Rugosa Hybrids are deservedly in the front rank. It is in the neighborhood of 50 years

since Madam Georges Bruant was sent out. The flowers are large, semi-double, very sweetly scented, and in color are almost white, having a slight creamy shade. Under favorable conditions, that is, where they are encouraged to send up fresh growths, blooms will be produced all through the season. Blanch Double de Coubert seems to be a double form of *Rosa rugosa alba*; it bears a pure white flower, is free blooming, and should be in every collection. Conrad F. Meyer is regarded by nearly everyone who has seen it as being one of the finest Roses in cultivation. In deep rich soil it gives a profusion of rich, silvery pink flowers. There are several other varieties, all of them well worth growing. Added to the charm of their flowers the foliage is bright green and abundant. These Roses are very hardy and stand our hot Summers exceptionally well. To prolong the season of bloom the large fruits should not be allowed to mature.

PERNETIANA HYBRIDS

There is a group of varieties originated by Pernet-Ducher et Cie which are hybrids between Harrison's Yellow and the Hybrid Teas. This is a comparatively new group of yellow and apricot sorts, worthy of wider cultivation.

YELLOW BRIAR ROSES

The Austrian Briars are among the earliest to flower; they form good sized bushes and require little attention in the way of pruning. Austrian Copper has large, single flowers of a brilliant coppery red on the upper surfaces of the petals; the under surfaces are much paler in color. Austrian Yellow has large single yellow flowers. Harrison's Yellow and Persian Yellow are semi-double forms. *R. Hugonis* is a small, single, yellow-flowered Rose, not quite well enough known to obtain a reliable opinion of its merits. The flowers are small, lighter in color than those of the Austrian Briars. *R. xanthina*, also a yellow flowered species, is attractive on account of flowers, foliage and spines; the latter are large and bright red. What appears to be a double form of this species has recently been introduced. It has the distinction of blooming a week or so in advance of any other Rose and is evidently very hardy.

WICHURAIANA HYBRIDS

The Memorial Rose hybrids have come into prominence of late years and deservedly so. The female parent, *R. Wichuriana* (*R. Lucie*) is a Japanese species, of a rambling habit, with clusters of

small white flowers, which open late. The leaves are small and shining. The plant lasts only a short time in bloom, but a well-established subject bears thousands of flowers. This is the easiest of all Roses to propagate. The new races of hybrids which have been raised lately are, in some cases, several weeks ahead of *R. Wichuraiana* in blooming; they appear to be very hardy. The flowers of *R. Wichuraiana* are capable of being fertilized with pollen from a large number of different varieties, and the resulting progeny varies greatly. Some have large, single flowers exceeding in size any of the recent hybrid Sweet Briars; others are small, very double, with petals arranged like the florets of a Zinnia. Some again have the flowers so closely resembling those of the variety *Hermosa* as to be mistaken for these, but the habit of all the seedlings partly suggests their parentage. W. A. Manda of South Orange, N. J., was the first to raise hybrids from this species.

PENZANCE BRIARS

Lord Penzance has given us an excellent addition to the Briars in his hybridizations of the Sweet Briars, *Rosa rubiginosa*, with some of Hybrid Perpetuals and Teas. The flowers are bright, cheerful and single, and the foliage is sweet scented.

POLYANTHA, OR BABY RAMBLERS

Resembling the Rambler Roses, but of dwarf habit, we have a group of admirable sorts, namely: *Triomphe Orléanais* is a cherry colored variety; *Erna Teschendorff* is as bright as *Gruss an Teplitz*; and *Ellen Poulsen* a crimson pink, floriferous and vigorous.

CLIMBING ROSES

There are several species which have worked marvelous changes in the climbing Roses. *R. multiflora* was the first to be developed. It gave us *Crimson Rambler*, the most popular climber for many years. Later came the use of *R. Wichuraiana* in the hybrids and varieties with superb, glossy foliage resulted. *Dorothy Perkins* illustrates this group. There is one other species, the *Prairie Rose*, *R. setigera*, which has given us some superb varieties with large single flowers borne boldly on huge trusses; the *American Pillar* being a variety. Climbing Roses require little pruning except to thin out old branches. These sorts, however, should be severely pruned back at planting.



CLIMBING ROSE LUCILE

Some of the Good Varieties of Climbers

- Dorothy Perkins. Delicate pink. One of the best pink climbers; foliage excellent, glossy.
- Philadelphia. Crimson. A much better Rose than Crimson Rambler, but a trifle later.
- Excelsa. Deep crimson. An exceedingly hardy, rapid growing climber of a brilliant color.
- Tausendschön. Several shades of pink. One of the large flowering climbers, indispensable for each person's Rose garden.
- Christine Wright. A lovely pink. Large flowers, borne singly and in cluster; beautiful in bud and bloom.
- Hiawatha. Ruby carmine. One of the finest single climbing Roses; the plants are a mass of bloom.
- Silver Moon. Large, single white. Superb foliage; rampant growing.
- Dr. Van Fleet. Salmon pink. A double and a good grower; long stems.
- Aglaia. Yellow Rambler. A good lemony variety with numerous stamens.
- Gardenia. Superb glossy foliage and truly Gardenia-like flowers. Excellent if hardy. It is inclined to freeze back to soil in colder regions.

WHEN TO PLANT GARDEN ROSES

When you decide to plant some new Rose bushes, select a good spot; one that receives the sun the greater part of the day, a place which is a little sheltered from the wind, but not surrounded by high fences or buildings, remembering at the same time that many trees rob Rose beds of their fertility and moisture. Dr. Huey, of Philadelphia, once said that it was much better to plant a fifteen-cent Rose bush in a fifty-cent hole than it was to plant a fifty-cent Rose bush in a fifteen-cent hole. This fifty-cent hole need not cost us a cent, except some good exercise. Soil for Roses should be prepared at least two feet deep and its enrichment should consist of the addition of well decayed, not fresh, manure. One always thinks of Roses as preferring clay soil and it is very true that when Roses are once established in this soil their blooms are large and of excellent substance. Roses when set out among other plants hardly do so well as when assigned to a definite bed of their own. These beds should be not less than 3 feet and not more than 6 feet wide. When the beds are too narrow, the grass roots intrude from both sides and rob the Roses and when too wide it is difficult to pick the Roses without one's shoe becoming muddv. Furthermore, it looks nicely to see a bed which is perfectly cultivated and which has not been stepped upon. It is much better to plant in the Spring, in which case we do not have so great a loss of plants. This does not mean that we cannot plant in the Autumn, but there is danger of the plants not becoming established before the frigid conditions of



ROSE DR. W. VAN FLEET

Winter. Let us then prepare our soil by digging deeply in the Autumn and wait till Spring to set the plants.

SUMMER TREATMENT

The Rose always appreciates a loose layer of soil above its roots so that throughout the whole season the hoe should be diligently used. Mulching in mid-Summer with grass clippings or well decayed manure will also be of value. Those varieties which have been budded upon the Manetti, or wild Rose, stock, are very apt to produce suckers from the roots. The suckers are usually very strong and will soon crowd out the growth from the desired variety. The Manetti can be distinguished by a greater number of leaflets than the Hybrid Teas, Tea or Hybrid Perpetuals; at the same time the foliage usually presents a differently toothed and duller appearance. Perhaps the best fertilizer for Roses is well decayed manure supplemented by an application of bonemeal which can be applied at any time during the growing season. If one will start early in the Spring to syringe the Roses, the foliage can be kept clean of some insects and much dust. In order that syringing of this sort be the most useful, it is necessary to apply the water with good force. This will dislodge the plant lice and red spider.

WINTER PROTECTION

The main injury from cold is due to the sun which causes an alternate freezing and thawing of the branches. A sunshade should be given rather than an overcoat. The best method of protecting the plants of the more tender groups is by mounding soil about them a foot deep. When the warm days of Spring have surely arrived this can be easily removed. The tops are protected either with a wrapping of paper and straw or covered by some sort of box. Empty orange boxes prove rather useful in some cases. The dwarf Roses are nicely protected by using evergreen boughs. The Briar Roses, the Damask and the Moss need no protection. But in order to be safe it is better to protect the Hybrid Perpetuals. The Hybrid Teas and Teas should never be allowed to remain through the Winter without some protection.

PRUNING

If one notes the habit of growth of the Rose, the pruning will prove a much simpler problem than it would seem at first sight. The flowering stems of a Rose are produced from wood of the cur-

rent or the previous season's growth. The weakest shoots should always be pruned most vigorously. If one wishes to obtain good flowers of the largest size the bushes must be pruned very severely, but if one prefers a mass effect, only the dead branches and those which have become very old are removed. It is best to prune early in the Spring rather than in the Winter for one never knows how much more of the plant will freeze. When cutting off a shoot cut it just above a bud, which is on the outside. This will make the growth outward rather than toward the center of the plant. Tea Roses, which winter-kill to within a few inches of the soil when not perfectly protected, should have all the dead material removed and besides each branch must be shortened one-third.

CUTTING ROSES

It is a simple operation to cut a Rose, but few persons realize the advantage of cutting them properly. The cutting of the blooms of the perpetual blooming varieties often governs their ability to bloom until Autumn. Always remove all wilted blooms. Cut the stems long, using a sharp knife. Allow several eyes at the base of the flowering shoots; these latter will send up additional flowering shoots. All blind wood or wood which does not end in a bud should also be cut back.

PROPAGATION BY CUTTINGS

Roses for outdoor growth are propagated by budding, grafting and from cuttings. When it is desired to put cuttings in the open ground the work should be done during the first half of October. Select a sheltered spot. Have the ground freshly worked, or, better still, the cuttings may be put in as the ground is dug. The cuttings should be at least nine inches in length and only an inch or so should be exposed above the surface. Those cuttings having a heel are not so liable to decay as those cut between leaves, or at the base of a leaf. They should always be put in with the aid of a spade, as it allows firming with the feet; and if the soil needs it a little sand should be added while the trench is open, to induce healthy rooting. Half-rotted leaves, or rough stable litter, should be spread over the whole during hard freezing weather. When they are to be rooted indoors, the cuttings should be taken off later, tied in bundles and their bottom ends placed in moss, in a place low enough in temperature to keep the buds dormant. In Spring place in a gentle bottom heat, with the atmosphere cool. They will root readily by this method. The cuttings must be potted before the roots get long.

In potting have the soil moderately moist, so that they will need little water until the roots begin to take with the soil.

AMATEUR METHOD OF MAKING CUTTINGS

To the great majority of amateur Rose growers the propagation of the Rose by very easily manipulated methods is comparatively unknown. There is a method so easy that every boy and girl may, with a little care, increase the number of their plants. The almost certain method of making a long stemmed cutting and rooting it under a glass fruit jar where the plant is to grow, is one of the best and easiest. If the stem of the cutting is about 8 inches long and when in place the entire stem below the two topmost leaves is buried in the soil success will result. It is wonderful how these cuttings will root with but little attention beyond giving a little water occasionally. Many more Rose plants would be sold if children only knew this very simple method. A still better method is to place the long cuttings in pots and bury the pots deep enough so that only the tops of the cuttings are above the surface and sink them deep enough in the soil so that the two top leaves only are above the surface, placing the fruit jars on them and watering occasionally. This method allows the rooted plant to be lifted in its pot and planted out in any part of the garden desired. It is usually the case that this rooted cutting will make a much better plant than the ordinary short-stemmed cutting. The school children can root Rose cuttings by this method just as successfully as any other plant and have the rooted plants within a few months every whit as good and strong as those plants which cost anywhere from 10c. to 50c. per plant. The suggestion is to root the stems of the greenhouse Roses after they have finished blooming.

PROPAGATION BY SEEDS

New varieties are largely raised from seeds ripened from hand-pollinated flowers. In raising plants from seeds, if sown as soon as ripe, they germinate very irregularly. Some of the Hybrid Perpetuals will germinate part of a crop and some of them will flower in two months from date of sowing. Other seedlings, germinated at the same period, will take at least a year to bloom, while other seeds of the same batch will lie in the seed pan over a year before vegetating. The reason why the seeds sometimes remain a long time in the soil before germinating is owing to their being inclosed by a horny substance. This should be softened before sowing, by allowing the seeds



EXTRAORDINARILY SUCCESSFUL RESULT OF CROSS POLLINATION

to remain in boxes of finely sifted sand during the Winter, the boxes to be buried several inches below the surface of the soil out of doors. In removing the seeds from the sand previous to sowing, use a sieve with a small mesh; empty the sand (which is likely to be wet) into this, and force the sand through the meshes with the aid of a stream of water from the hose. The seeds should then be sown before getting dry. Care must be taken to remove them from their Winter quarters before vegetating, which they are apt to do, even when they are deep in the soil, as soon as the temperature of their surroundings reaches 40 degrees. Another method of treating Rose seeds, especially those which ripen as a result of cross pollination, and one, which if carefully done results in quick germination, consists of cutting off one end of the achene a little at a time until the seed is partly exposed. This can only be done with great care and with the aid of a

dissecting microscope, a sharp knife and lots of patience. I have found that seeds so treated sprout very quickly when sown in clean, large grained pure sand. It is only the large achenes which lend themselves to this treatment; the smaller ones, such as are found in the hips of the *Wichuraiana*, are too small to be worked successfully, and in this case there is little necessity for treatment of this description, as the seeds germinate very successfully after being stratified out of doors during the Winter months.

PROPAGATION BY GRAFTING

There seems to be a difference of opinion as to the benefits to be derived from this method of propagation, but each grower may settle it for himself by giving it a trial. The stocks should be prepared by potting in 3-inch pots; in thickness they should correspond as near as possible with that of the cion—the cion should never be of a greater diameter than that of the stock. Any of the common methods of grafting will answer. The cion should be securely fastened in position with raffia. As soon as tying is completed, it is necessary that the plants be kept in a suitable atmosphere to preserve the leaves of the cions so that the union may be hastened. In grafting hybrids this is not so necessary, as they can be handled without leaves. A brisk heat under the plunging material will quicken the action of the roots and effect a union safely without the aid of a frame; but with *Teas* it is necessary to have them in an almost air-tight structure. If only a few hundred are to be experimented with, part of a side bench may be set apart for the purpose of receiving the grafted plants, and may be prepared as follows: Have the front and back boards higher than the plants. Ordinary sash laid lengthwise of the bench will suit all right, provided they can be arranged so as to keep the atmosphere warm and humid. To facilitate easy access to the plants the sash may be temporarily hinged on to the back boards with pieces of leather, and the sash tilted in front with a stick. Select a stretch of bench that can be relied upon to supply a temperature of from 70 to 80 degrees inside of the frame. First put a layer of sphagnum on the bench—one inch closely packed will do. Over this put some ashes, or sand, on which to stand the pots. The other conditions necessary for a quick union will readily suggest themselves, air being given very gradually after the union has taken place. When hardened off, growth will be accelerated by a shift into larger pots.

CHAPTER XIII

Vines, Hardy and Tender

ACTINIDIA. *A. polygama* and *A. Kolomikta* are beautiful deciduous woody climbers, very different in general appearance from all other hardy vines; both are natives of Manchuria. For some reason they do not flower satisfactorily in Washington, but in California they do grandly. Actinidias are at their best when grown on trellis work.

Propagation. The proper time to propagate is when the young growths are in the ripening stage. Cuttings should be rooted early enough in Autumn to go into 3-inch pots and occupy frame space before the arrival of cold weather.

ADENOCALYMNA. *A. comosum* is one of the best tender vines where it can be given enough headroom. If planted out and otherwise treated according to its requirements, it will make growths 70 feet in length. It is closely related to the Bignonias. Flowers are bright yellow, being borne in large racemes. It blooms in mid-Winter.

Propagation. Propagated by cuttings of the ripe wood in late Summer.

ADLUMIA (Climbing Fumitory). Every florist who wishes his place to be attractive out of doors in Summer should reserve a few nooks for the seeds of the charming climber *A. fungosa (cirrhosa)*. In places where most other things will not grow it makes a good showing. It is exceedingly attractive, takes care of itself and comes up year after year. Seeds are produced in abundance. The foliage to a certain extent suggests that of *Adiantum cuneatum*; both foliage and flowers are handsome.

Propagation. Being an annual it is best to sow the seeds where the plants are to grow, because even small specimens transplant but poorly.

AKEBIA. Although a climbing plant, and a very handsome one, *A. quinata* is frequently grown to answer the same purpose as bush plants of *Jasminum nudiflorum*. For this purpose it should

be allowed to ramble over low supports. For trellis work it is well adapted. Although a common plant we seldom see it in fruit, which is probably accounted for by the fact that the pistillate flowers come into bloom before the staminate ones, thus preventing fertilization.

Propagation. Its propagation is brought about from cuttings of the current year's growth, choosing wood not too thick nor yet the weakest branches. Make the cuttings with two or more leaves on them, and place together in a cool bed; root them in time to be put in a cool frame for the Winter.

ALLAMANDA. Among the select flowering plants for temporary or permanent use in tubs we must include the large flowering Allamandas known as *A. cathartica*, *A. Schottii* and *A. grandiflora*. Most of the species are used as greenhouse climbers. They will thrive in shade or sun; where a little shade is available the flowers naturally last longer. The flowers are large, almost the size of the Moonflower, but more lasting; the shoots ramble over the sides of the tubs. The best upright growing species is named *A. Williamsii*, a grand plant either for boxes, tubs or for bedding out; it is easily propagated in the Fall from ripe cuttings. The larger flowered kinds, when represented by large plants, are very desirable for isolating on a lawn.

Culture. A good, rich, light soil is necessary, and if a tub is used for the plant put enough drainage in the bottom so that the plant when knocked out of the pot will rest on the drainage. Ram the soil firmly around the ball, shorten back the strong growths and stand the plants in a partly shaded spot, syringing frequently. In a few weeks' time, the kinds grown under the names *A. Wardleana*, *A. Hendersoni* and *A. Schottii*, will give an abundant display of their wide, trumpet shaped, yellow flowers. When trained near the roof of a warm greenhouse they may be had in bloom the greater part of the Winter months. In fact, they can be managed so as to have them bloom at any time of the year, by first resting the plants, pruning back and encouraging the root growth.

Propagation. Cuttings of the ripe wood will root in a warm propagating house at any season. Procure some young plants in the beginning of May and a little later plant in the open to make growth for cuttings. After cutting them back for propagation lift and pot, partly resting them for the Winter. For immediate effect after planting out start early in the Spring; one plant to a tub, among other things, is sufficient.

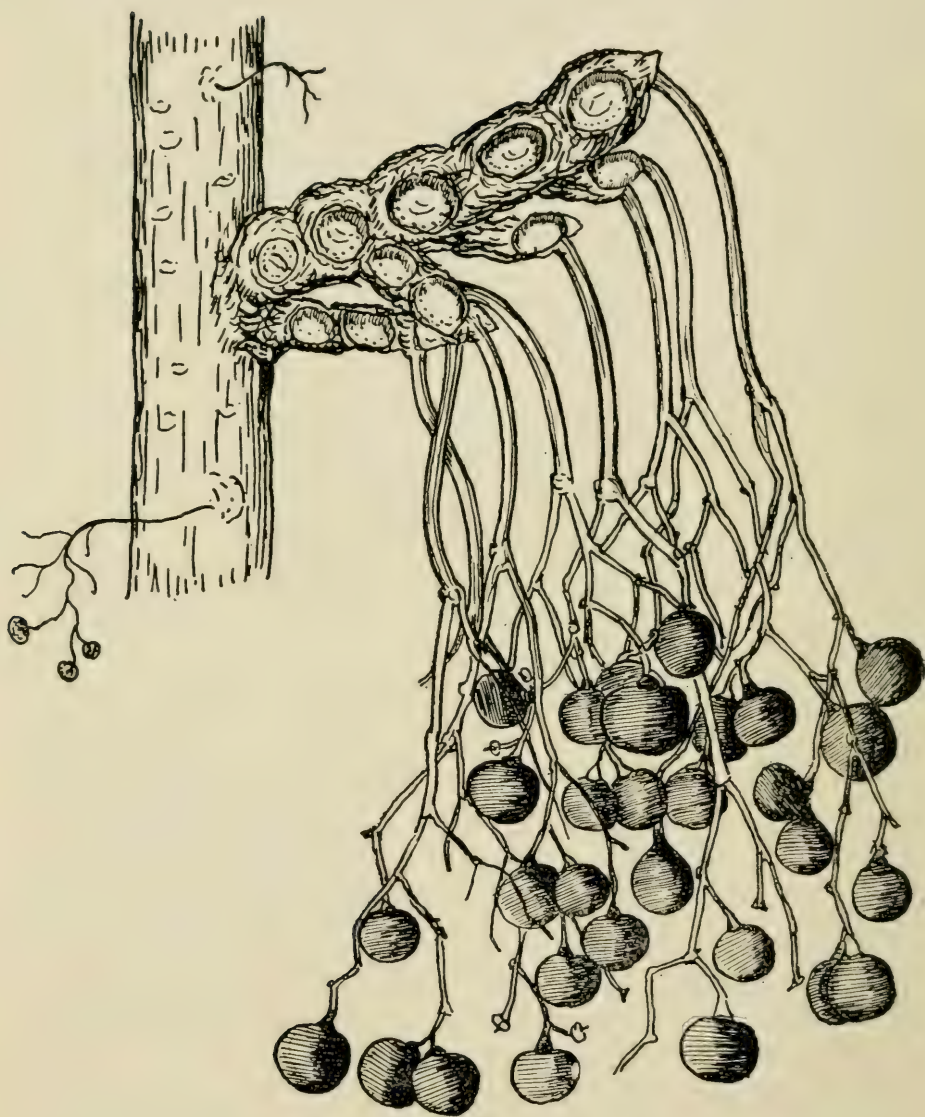


FIG. 20—*AMPELOPSIS VEITCHII*. FRUITING SPUR

AMPELOPSIS (Parthenocissus). *A. Veitchii*, the Boston Ivy, and *A. Roylei* differ from each other only in that the former is the smaller of the two in leaf and fruit. *A. Roylei* is, perhaps, the more rapid grower of the two. They are both ideal vines for covering walls, not only for ornamental appearance, but what is of more importance, in warding off the rain from the walls. It may be noticed that the foliage is imbricated; that is, the lowest leaves, the blades of which hang almost perpendicularly, are covered for nearly half of their length from the base by the ends of the leaves above; thus the water drips from one to the other instead of being absorbed by the substance against which the vine grows. Another good reason why it should be planted much more freely is, that it keeps the sun from the walls, making quite an appreciable difference in the temperature of the interior of the dwelling. *A. (Vitis) heterophylla variegata* is a vine of straggling growth, with very handsome colored foliage. It may be planted with English, or Boston Ivies to break the monotony of a large expanse of green. The variegated form comes true from seed. The fruit of *A. heterophylla* is remarkable in being green, creamy white and purplish at different stages of growth. *A. quinquefolia* var *A. Engelmanni*, *A. diversifolia* and *A. aconitifolia*, are all good kinds.

Propagation. The fruit may be gathered about the beginning of November, the seeds washed clear of the pulp, and sown in a frame having a southern exposure. Do not sow thickly as the cotyledons are large, and damping off may result before the seedlings are transplanted. By the middle of May the seedlings are ready for handling. They may either be put in small pots, singly, or three in a 3-inch pot, plunged in ashes in a frame, the sash put on and shaded for a few days until the young plants have taken with the soil. The Ampelopsis, owing to the nature of the roots, are best transplanted out of pots.

ANTIGONON (Mountain Rose). In the Southern States *A. leptopus* is one of the most satisfactory vines; even in Washington it blooms for about two months out of doors; that is, when put out as small plants. When large specimens are planted out the period of blooming is much longer. The flowers are bright pink, in very large clusters.

Propagation. It should be propagated from cuttings taken in September; make the cuttings with a single leaf attached, and cut below a joint. The large roots are tuberous looking, enabling the old plants to be easily wintered over in a cool house.



ARISTOLOCHIA STURTEVANTII

ARISTOLOCHIA (Birthwort). The Aristolochias are interesting because of their strange shaped flowers. *A. macrophylla* (siphon) is a native species, The Dutchman's Pipe, but it is far behind the tropical ones in the beauty of its flowers. Sometimes we need a vine for covering unsightly structures under the shade of trees; this is the best to be had, as it luxuriates under those conditions. It is most easily raised from seeds. *A. grandiflora* var. *Sturtevantii* and *A. elegans* are easy to grow, and are almost certain to produce an abundant crop of their exceedingly curious flowers. Both of these kinds may be planted out in Summer to cover trellis work. An intermediate house will suit them in Winter. *A. elegans* ripens seeds in the open at Washington. Farther north the seasons are too short, unless large plants are taken to start with.

Propagation. *A. g. Sturtevantii* has soft growth, more so than any other species, and roots very readily from cuttings. *A. elegans* gets hard soon after developing, and is a trifle difficult to root; but seeds are produced abundantly, and the seedlings are every bit as floriferous as plants raised from cuttings.

ASPARAGUS. (See page 63.)

BIGNONIA (Pyrostegia). *B. venusta* is one of the most reliable of our warm greenhouse climbers. The flowers are reddish orange

in color, and are produced in great profusion. It should be planted out in a box built of bricks, such box being large enough to hold several bushels of soil. The ideal way to train is to a single main stem along the rafters of the greenhouse. From this stem the growths on which the flowers appear are allowed to hang downward to their full length. By judicious trimming of these growths, and short resting periods before starting into growth, two crops of bloom may be had each year. The plant will bear full sunshine all the year round.

Propagation. Increased by cuttings of the ripe growths in March.

BOUGAINVILLEA. There are at least five kinds in cultivation. *B. spectabilis* is as free blooming as any, but only on large specimens. It is very useful for training along the roof in the same way as *B. glabra*. A season of rest, followed by severe pruning, usually induces an abundant flowering growth. *B. glabra Sanderiana* differs from the type in being smaller in the flower and more floriferous in a small state.

Culture. They should be allowed to make their growth out of doors, either in the small or large state. There is not much to be gained by planting out, as they make few roots. Plunging answers well enough, with a shift in midseason, if necessary. After the plants are brought indoors the large, soft growths may be shortened, and an intermediate temperature maintained until the plants are started into growth, when more water and heat are given. After they have made a start, doses of weak liquid manure are beneficial. When in bloom, gradually harden off, or the flowers will fall in showers. *B. glabra* blooms young and requires less heat than *B. spectabilis*. For training upon the roof the plants should be trained to single long stems, and flowered from lateral growths, pruning these severely just before growth starts.

Propagation. Small specimens from cuttings, rooted in the beginning of the year, will bloom the following Winter; but larger plants take a couple of years to develop.

BOUSSINGAULTIA (Madeira Vine). In well drained, sunny situations, such as may be found at the south side of a wall, *B. basselloides* frequently stands out all the year round in Washington, D. C. It is a favorite vine with a great many people. After the vines are blackened by frost, dig up and store in conditions similar to that of the wintering of Dahlia roots.



CAMPSIS (TECOMA) RADICANS. THE TRUMPET CREEPER.

Propagation. It is very readily increased by taking the little tubercles which form on the vine and sowing them in rows in the open, without supports. The tubers, which form underground, may also be taken, cut up into small pieces and treated in the same way.

BRYONIA (Bryonopsis). *B. laciniosa* is a slender cut-leaved annual vine, with rather handsome red fruit the size of a cherry, beautifully marked with white. It is grown principally as a warm greenhouse plant.

Propagation. Raised from seeds, which may be sown out of doors end of April.

CAMPSIS (Tecoma. Trumpet Vine). *C. chinensis (grandiflora)* differs from our native *C. radicans* in having very much larger flowers. It makes a very showy vine when in bloom late in Summer. A good plan to show off this vine to advantage is to grow it against a stout support, made of iron or wood, several feet high, and when it gets to the top encourage it to become bushy by frequent pinching.

Propagation. Increase in stock is sometimes attempted from portions of the roots cut into small pieces, but unless certain that the plant is on its own roots this is a dangerous practice and has resulted in much disappointment, as the resulting plants may turn out to be nothing but the native *C. radicans*, on which *C. grandiflora* is frequently grafted. After these root cuttings make considerable growth it is quite a difficult matter to tell whether they are *C. grandiflora* or the native species, so closely does the foliage of the two species resemble each other. Those on roots of *C. radicans* make plants quicker than from root cuttings, or from cuttings of the green or dormant wood. Cuttings of the branches are a trifle difficult to manage at any time, but the ripened growths of young plants will give the best results, as then the wood is not nearly so thick and pithy as in old specimens.

CARDIOSPERMUM. This is the Balloon Vine, so called from the appearance of the seed vessels, which are very much inflated. The seeds of *C. Halicacabum*, the common species, should be sown in semi-wild places. They are sometimes sown so they may climb on wire fences. The plants ripen a very large quantity of seeds, and they may be sown where the plants are to grow.

CISSUS. No other vine approaches *C. discolor* insofar as the beauty of its foliage is concerned. The leaves are reddish on the lower surface; on the upper surface the color is bright velvety green mottled with silver; stem red. It is usually grown in a warm

house, where its growth is very rapid. *C. antarctica*, the Kangaroo Vine, is a well known window plant, for which purpose it is admirably suited. It is not particular as to treatment.

Propagation. Cuttings of the ripened wood will root at almost any period of the year.

CLEMATIS. There are many beautiful species of Clematis for garden culture upon trellises, porches and pergolas. *C. paniculata* is a small, white flowered sort and is one of the tallest and most vigorous species. It blooms during August and September. It has risen in popular favor, being one of the best hardy vines in cultivation.

Varieties of *Clematis Jackmannii* and *C. lanuginosa*, that is, those having the large blue, purple, lavender or white flowers, some of them, the singles, being about 8 inches across and some double, are all worth attention, as they give an elegant display of flowers from June all through the Summer; that is, if properly attended to in the way of soil, mulching and watering. They all dislike limited root space and show it in poor sized flowers and few of them. Encourage them to make all the growth possible before cool weather. They should be started early in the season in a cool house not too much heated. With one or two flowers on they are ready selling plants, and all that are sold will be advertisements for next season's supply. Another method of propagation is to take cuttings of the young wood about the middle of June, and root indoors. This is the method mostly employed in this country; but grafted stock make the strongest plants in a given space of time, owing to the stronger root action.

The beautiful *C. texensis* (*coccinea*) is well adapted for wire trellis work. It is superior to *C. Viorna*. There are other good forms, such as Countess of York, Countess of Onslow and Duchess of Albany.

Propagation. Seeds of *C. paniculata* ripen in November. Raising from seed is the best and easiest method of propagation. If sown when ripe the seed will germinate early in Spring and make fair sized plants by the following Fall; but if kept till Spring, and sown then they will not germinate till the Fall; even then they have to be carried over in boxes in frames, and are not much in advance of the seedlings which germinate the following Spring. From this it will be seen that a year's growth is gained by Fall sowing. Like most other Clematisses, it does best in deep, heavy loam well enriched with manure. The varieties may be propagated from the beginning of January till the beginning of April. Lift a few roots of



CLEMATIS PANICULATA

such species as *C. ligusticifolia*, *C. paniculata* or *C. Viticella* for grafting of any of the sorts desired to be increased. Whip grafting will answer best. Tie the stock and cion together with raffia and place in a box of chopped moss, standing the box in a propagating frame with a temperature of from 65 to 70 degrees. Afterward they are gradually given air, potted on, and hardened off as they require it.

CLERODENDRON. A wonderfully floriferous vine, *C. Thomsonæ* can be flowered successfully in 6- and 8-inch pot. Old plants may be allowed to get in a dormant state in Autumn, reduced and



CLERODENDRON FLOWERS IN DIFFERENT STAGES

repotted in February, but as much as possible of the old wood saved, as from this they produce flowers on short growths. Each plant will require the support of three or four stocks. The flower is bright crimson, the calyx being large and pure white. *C. speciosum* in growth resembles the above; the flowers are scarlet, and the calyx tinged with red.

Propagation. Cuttings may be struck in Spring and planted out during the hot months to make growth.

CLITORIA (Butterfly Pea). *C. ternatea* is a half-hardy annual vine, and one of the very best, making an exceedingly pleasing display when in rich soil and given supports about 4 feet high.

The flowers are dark blue, in shape and size resembling those of the Sweet Pea. This vine is sometimes grown as a creeper, but the very attractive flowers are better seen when it is allowed to climb. It is an ideal plant for growing on iron railings. There are pink, white, and double flowered forms.

Propagation. The seed should be started indoors early. The seedlings, no matter how carefully they are tended, look as if they had a hard struggle for existence, but under the influence of full sunshine they will make good plants by the middle of May, when they may be planted out for the Summer.

COBÆA. When grown indoors as a perennial, *C. scandens* will attain a length of 30 feet. In this country it is principally grown as an annual for outdoor use in Summer. *C. s. variegata* is a variegated form for the greenhouse.

Propagation. As the seeds germinate quickly and need pricking off shortly, or almost immediately after germinating, owing to their large cotyledons, it will save time to put each seed in a 2-inch pot; fill the pots and merely press the seed in edgewise. No covering is necessary if the seed be pressed in deeply so that only the upper edge is seen when the soil is settled by watering. The variegated form is increased by cuttings.

CONVOLVULUS (Bindweed). This genus possesses many weedy plants which, when once they gain a foothold in the garden, are difficult to eradicate. Several are very ornamental when in bloom. One of the best, especially for baskets, an evergreen, with short, pendulous growths, is named *C. mauritanicus*. The flowers are blue, and about an inch across. *C. tricolor* makes a very suitable plant for hanging baskets.

Propagation. This plant is usually increased by division, or cuttings of the ripe growths early in Spring. Seeds are also offered.

Culture. A fibrous soil is preferred by these plants in the greenhouse.

HEDERA (English Ivy). The varieties of *H. helix* are numerous; some have very small leaves as in *H. Donerliensis*, others are very large leaved, as, for instance, *H. dentata*. Others again are beautifully variegated. *H. h. var. baltica* seems the hardiest form. Nearly all of the Ivies make good pot plants, and some of the varieties will develop more leaves and stems to a given size of pot than any other plant in cultivation. The less sun the plants get in Winter the harder they will be, as rapid thawing and freezing is



HEDERA HELIX—ENGLISH IVY

injurious to the foliage. Where a supply of leaves is wanted during the Winter the vines may be planted on a position sloping to the north. In cold localities a light covering of fine branches will be beneficial.

Propagation. If the cuttings are taken from outdoor plants propagation should be done in Autumn, as then the foliage is at its best, and it keeps splendidly during the Winter months on good sized cuttings rooted in frames. The variegated kinds should be given the protection of a frame, especially for stock purposes; and cuttings of these kinds are rooted in March. They will not root so freely from large sized cuttings as from more moderate sized ones.

HIDALGOA (*Childsia*. Treasure Vine). *H. Wercklei*, the climbing Dahlia, is a native of the mountain regions of Costa Rica. It is a vine of soft growth with compound leaves. The flowers are

not unlike those of a single Zinnia; the color is intense scarlet. Like other greenhouse vines of this family (Compositæ), such as the Mutisia, the weak growths will not produce flowers, consequently the plants should be encouraged to make robust growth, especially during the late Winter months, to flower in April and May. When planted out in Summer the vines make very rapid headway, but the flower display is meagre. For the Southern States and California it may turn out to be a very desirable vine. With us it seems to thrive best in a rather cool house.

HOYA (Wax Plant). *H. carnosa* is the most popular of the genus. It has large umbels of flesh colored flowers. It is a popular house plant with many. There is a beautifully variegated form. In Summer the plants may be plunged in the full sun out of doors. An intermediate house and only a moderate supply of water will suit them in Winter.

Propagation. For cuttings take good sized pieces, pot and plunge in brisk bottom heat. The young plants should, if started early, be given a rather high temperature.

HUMULUS (Hop). In the warmer parts of the country, *H. japonicus* var. *variegatus* is a hardy annual, and one of the most handsome of those having variegated leaves. To have an early growth, the seeds should be sown about the beginning of March and the seedlings potted off singly when large enough. Green leaves preponderate on the seedlings, gradually becoming better colored as the plants increase in height.

IPOMŒA (Morning Glory. Moonflower). The Japanese Morning Glories vary much in the color of the flowers, and while some of them are undoubtedly pretty there are numerous shades which will never become popular. Few sorts approach in beauty the well known *I. Learii* or the kind known as *I. rubro-cærulea*. The first named is evidently a perennial without tubers, and it is propagated from cuttings; the last named, from seed. The tuberous-rooted kinds need only to be treated like Cannas or Dahlias during the Winter. In Summer few climbers can equal them in perpetual masses of bloom. *Ipomœa digitata* (*paniculata*) is probably the best of the lot. Other good ones are *I. hederacea* (*scabra*), *I. Hardingii*, *I. Horsfalliæ* and *I. insignis*. The two last named are nearly alike, but *I. insignis* is the better for Summer bloom. *I. macrorrhiza* (*Michauxii*), a native of the Southern States, makes an excellent outdoor vine if started early in the greenhouse. Under cultivation the large flowering variety of the native *I. pandurata* makes a

display of bloom never seen in a wild state. As to their propagation, *I. Horsfalliæ* and *I. insignis* are either rooted from cuttings taken during September, or grafted on seedling stocks of *I. pandurata*. The other tuberous rooted kinds are best raised from seed, which should be preserved in the capsules until the beginning of February and sown in boxes of chopped sphagnum, in which they germinate much sooner than in soil. Keep in a growing atmosphere, as the seedlings are prone to develop tubers and go to rest shortly after the seed leaves are formed.

One of the best flowering vines of moderate growth for the decoration of the greenhouse during the Winter months is *Ipomœa Briggsii*. Most of the other *Ipomœas* bloom during the Summer, but this one makes a liberal supply of shoots during the Summer from which it blooms during the dull months of the year. The color of the flowers is very deep crimson. The old plants should be repotted in early Summer, using light, rich soil and giving them pots large enough to flower in. As the shoots develop they should be tied around stakes, and later on, if wanted to cover pillars or rafters, these shoots can easily be untied and fastened in the positions in which they are wanted to bloom.

The flowers of *Ipomœa grandiflora* and *I. Bona-nox* (Moonflower) are pure white and very large, opening about dusk and lasting till morning. They are propagated by cuttings. Plants from Autumn-rooted cuttings which were shifted on after the first potting, will, by the beginning of February, be throwing out a quantity of shoots which are intended to be utilized for cuttings. When these shoots get a foot or more in length nip the ends out, as by doing so the remaining part will ripen more quickly and provide better material for single eye cuttings. The plants from these will be large enough by planting out time. Large flowering plants of the common Moonflower will often ripen considerable quantities of seed; these, when gathered, are very large and rather soft, but when kept for some time they diminish in size and get very hard, so much so that they refuse to germinate under ordinary conditions. Put them into a saucer of water and stand the vessel on a warm bench for a day or two, when the seeds will soften. This condition will be indicated by their swelling to two or three times their normal size; they should then be sown singly in small pots, keeping the soil only slightly moist to prevent rotting.

The Moonflower is again coming into popularity in certain sections of the country. At the planting out season the vines are unattractive looking, and as most people want plants in bloom when

they buy, the Moonflower is often overlooked. Plants should be in 4-inch pots before planting out, as those out of smaller sized pots take too long a time to develop.

KADSURA. A rather attractive looking vine, *K. japonica* is allied to the Magnolias, with small yellowish white pendent flowers.

Propagation. It is propagated from the ripe wood in August.

LAPAGERIA. This subject is one of the choicest of cool greenhouse climbers, but our hot Summers are not favorable for the growth of the Lapagerias under ordinary circumstances. *L. rosea* has rosy crimson, drooping, bell shaped flowers and *L. albiflora* has whitish flowers. Where a cool, shaded spot can be devoted to it, success may follow. To flower well the Lapageria should be planted out.

Propagation. Propagation is best effected by layering the stems.

LATHYRUS (Perennial Pea). *L. latifolius albus* is among the finest of Summer flowering herbaceous plants. The flowers are pure white and come in very useful for making up designs. It is a comparatively scarce plant and the seeds offered by dealers are not always to be depended upon, as the pollen from the pink flowered one, usually to be found in gardens, seems to act quicker on the stigmas of the white variety than its own pollen. In seeding they should be kept apart so that there will be no danger of their mixing. In a temperate house the plants will only be in 3-inch pots by planting-out time in the Spring. To support the vines run some stout branches in the ground around the plants, bend and tie together at the top. *L. odoratus*, the Sweet Pea, is discussed on pages 157 and 238.

Propagation. Sow the seeds indoors, in boxes or flats, and keep in growth all Winter.

LONICERA (Honeysuckle). *L. sempervirens* is a most beautiful native species; the flowers are dark red and yellow. There are several varieties; one has pale yellow flowers. *L. caprifolium* has large, yellowish flowers; *L. Periclymenum* is the common English Honeysuckle. It is a very strong growing vine and exceedingly fragrant. *L. japonica* produces flowers dull red and white; very fragrant; a most profuse bloomer. *L. Halliana*: the flowers of this species open pure white, changing to a dull yellow; when the plants get sufficient moisture they continue blooming all Summer. *L. japonica* var. *aureo-reticulata* is a weak grower if not planted in good soil. It is grown for its beautifully marked foliage, which is netted

with yellow. *L. Heckrottii*, a species with glaucous foliage and very handsome reddish pink flowers, blooms continuously from near mid-Summer.

Propagation. All the kinds root freely from ripe wood after mid-Summer.

LYSIMACHIA (Money Wort. Creeping Jenny). *L. nummularia* will thrive in shade or sun. There is a pretty variety with yellowish leaves.

MANETTIA. *M. glabra* (*cordifolia*) is one of the handsomest of the low-growing flowering vines, growing about 4 feet in a season, and covered from mid-Summer on with bright red, tubular flowers. It is almost hardy in the District of Columbia, surviving ordinary Winters with the protection of some litter thrown over the crowns. *M. bicolor* is apt to run too much to weedy growth during Summer, especially in the warmer parts of the country.

Propagation. Green wood cuttings of *M. bicolor* root quickly. Those propagated early in September make nice flowering plants in 4-inch pots for Winter blooming in the cool conservatory. On the other hand, green cuttings of *M. glabra* are not very easily rooted, nor does the plant give an abundance of material for this purpose. But by root cuttings a one-year-old specimen may be made the parent of a hundred or more plants. To give large and healthy roots for this purpose, the plants should be planted out early. By the middle of October the tops are cut off, the roots lifted and put in boxes of sand for a few weeks. In preparing for the root cuttings take a box, in the bottom of which put some rough screenings, then 2 inches of fine soil made very firm; put the pieces of roots (about three-quarters of an inch in length) on the surface, then cover with three-quarters of an inch of coarse-grained sand and put in a warm house. When the growths have made two pairs of leaves put each growth in a 2-inch pot, shifting into 3-inch pots as they require it.

PÆDERIA. *P. fœtida* is usually grown as a stove and greenhouse climber, but it is hardier than is generally supposed. We have had old plants which have stood out in the open border for over 20 years. It is rather an attractive looking, but not a free blooming vine. The leaves or any part of the plant, when bruised, emit a most offensive odor.

Propagation. Cuttings should be put in any time after the growths are matured.

PARTHENOCISSUS. (See *Ampelopsis* p. 363.)

PASSIFLORA (Passion Flower). *P. incarnata* is said to be hardy around Philadelphia. It is one of the most rapid growing species; has large, whitish flowers and bears seeds abundantly. *P. cærulea* is apt to get killed to the ground in Winter north of Washington. *P. c.* Constance Elliott is a white flowered variety seemingly hardy and more floriferous than the type. Imperatrice Eugenie, Innesii, Lawsoniana and Munroi are good hybrids. *P. alata* and *P. quadrangularis* (*Granadilla*) are stove climbers with large, handsome flowers. *P. aucubifolia*, a variety of the last named, has the foliage handsomely marked with yellowish blotches.

Propagation. Stock plants will Winter if planted in a frame, the back of which is formed by the wall of a warm house. These may be propagated from cuttings of ripe growths any time in late Summer. The Passifloras are easily propagated by seed. The seed germinates slowly. Half-ripe wood should be used for cuttings.

PETREA (Purple Wreath). *P. volubilis* is a greenhouse climber of very irregular growth, bearing in March and April long racemes of very showy purple flowers. The calyces are only a few shades lighter in color than the corollas. This plant should be in every greenhouse collection. It is very suitable for training up rafters.

Propagation. Cuttings of the dormant wood will root in heat; the best time to do the work is just before the plants start into growth.

PUERARIA (Kudzu Vine). *P. hirsuta* (*Thunbergiana*) has for several years been distributed throughout the country under the name of *Dolichos japonicus*. It is a hardy, trifoliate leaved vine, having inconspicuous, purplish pea shaped flowers, which are seldom produced except on the old wood of well established plants. The flowers amount to but little, however, in fact, no one would grow the vine on account of the flower display. It is the rapidity with which the vine will cover space which has made it a favorite with those who have given it a trial. It is, without doubt, the most rapid growing hardy vine in cultivation, and is very useful for covering the ground, for trellis work, and especially for hiding unsightly structures.



PUERARIA THUNBERGIANA. THE KUDZU VINE.

Propagation. Cuttings should be put in by the end of August, to enable the plants to make a little headway so as to stand over Winter safely. The leaves, being large and soft, should be laid flat on the sand without being shortened back in any way, and allowing only about 3 inches of stem with each leaf. Roots are produced from the under part of the stem a short distance from where the leaf joins. It seldom happens that cuttings root in the ordinary way, that is, from the cut part of the stem, so that they are ready for potting in a few days after being put in the sand. Good plants may be had in a short time by layering during August, keeping the ground moist during the operation.

QUISQUALIS (Ragoon Creeper). *Q. indica* is a very desirable climber which can be grown to perfection only in the largest conservatories, such as the palm houses of public gardens. It should have several cartloads of good soil to grow in. It is one of the most desirable climbers, and furnishes myriads of flowers which are admirably adapted for cutting.

Propagation. Young plants are easily raised from the newly ripened growths.

SCHUBERTIA (Araujia). It is seldom that we see this noble vine grown well in greenhouses, the plants being usually sickly and infested with mealy bug. As a Summer vine out of doors *S. grandiflora* makes very vigorous growth, and after mid-Summer it bears a profusion of bloom. The flowers are not unlike those of *Stephanotis floribunda*, but are larger and quite as sweetly scented.

Propagation. Cuttings make the best flowering vines. These may be taken from the ripe wood before the advent of cool weather. Seeds are freely produced in large, egg shaped fruits; they germinate freely shortly after being sown.

SENECIO (Parlor, or German Ivy). *S. mikanioides* is the species commonly grown instead of *S. scandens* as usually advertised. The plants are useful for long growing vines at the front of window boxes and urns.

Propagation. A few plants struck from cuttings in the Fall will give growth for a large number of cuttings after the first of the year.

SOLANUM. In the Southern States *S. Wendlandii* should prove a desirable garden vine. The flowers are arranged in cymes from 6 to 10 inches across (bright lilac blue) on the ends of the hanging branches. In this latitude the seasons are too short for small plants

to make much of a floral display in the open. As a greenhouse climber, however, it ought to have a place where sufficient room can be devoted to it.

Propagation. Cuttings should be made from the short, lateral growths, taken about the end of September.

STAUNTONIA. *S. hexaphylla* (also known as *Holbællia latifolia*) is one of the best climbers in Washington. The Winters have not harmed it in the least for the past 15 years. In places where it is partly shaded from bright sunshine the splendid foliage will persist during the Winter. The leaves are much larger than those of the Akebia, to which it is closely related. It flowers very freely. Seeds are obtained from Japanese dealers in quantity. Where it does well, it is one of the best evergreen vines.

Propagation. Cuttings of the ripened growths will root fairly well in the cool propagating house during the Autumn months.

STEPHANOTIS. A great deal of roof space may be successfully utilized in the growing of *S. floribunda*, the flowers of which are white and fragrant.

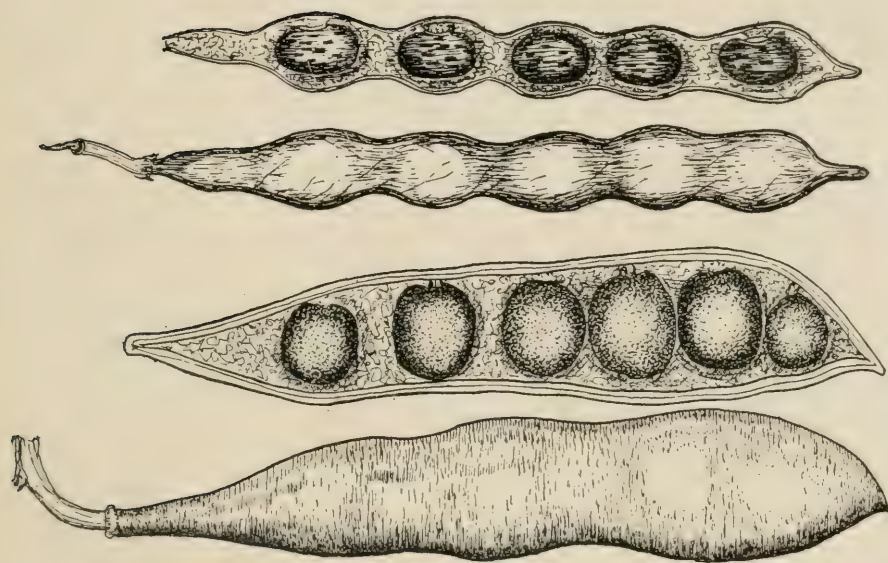
Culture. The plants may be put out in benches in the greenhouse and trained up the rafters, but the bench must be one which will not need repairing every now and then. The best plan is to have a rather deep box of soil specially prepared. Fibrous loam, enriched with manure; some charcoal and crushed bone will keep the soil open. It is not necessary to have a high temperature in Winter, as most of the growth will be made during the Summer months.

Propagation. Start with cuttings, as they flower much more abundantly than plants grown from seed.

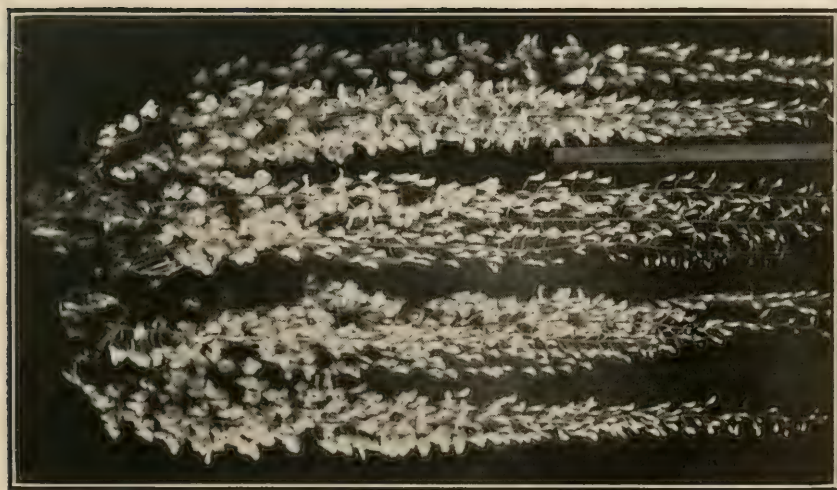
STIGMAPHYLLON (Butterfly Vine). The flowers of *S. ciliatum* are not unlike those of some species of *Oncidium*, both in form and color. It is one of our best medium sized vines for trellis work. For pot culture it is of little service, and only thrives in the greenhouse when planted out.

Propagation. September is the best month for propagation. On outdoor plants much of the wood is useless for this purpose, being thin and soft. Choose the growths which were made early in the season; a heel or a joint is not necessary. Root them in bottom heat, potting in 2-inch pots, and afterward in 3-inch pots, in which they will pass the Winter.

TACSONIA. These plants are closely allied to the Passion Flowers and, if anything, they are more graceful. Several of them are used out of doors, principally in California, where they make a



WISTARIA FRUTESCENS
WISTARIA CHINENSIS
SEEDS AND PODS
WISTARIA MULTIJUGA



WISTARIA MULTIJUGA. SPRAY OF
FLOWERS.—See page 382

splendid showing. *T. Van Volxemii* is a commonly cultivated species. In the East they are used as climbers in ornamental greenhouses.

Propagation. They are propagated at almost any time of the year from cuttings of the ripened growth.

THUNBERGIA. This genus includes some very desirable greenhouse climbers, and at least one species, with several varieties, useful for vases, baskets, and as a vine of moderate growth for the mixed border. This is *T. alata*, one of the several plants known by the common name Black-eyed Susan. Seeds will germinate outside, but to produce early effects they may be sown indoors early in the season and hardened off with other softwooded plants. The best greenhouse species are: *T. laurifolia*, white and blue flowered; *T. fragrans*, pure white, and *T. mysorensis*, purple and yellow.

Propagation. The perennial species may be raised from seeds, but plants obtained in this way are apt to have a weedy growth and turn out to be shy in blooming. Cuttings put in about February will furnish the finest flowering plants.

TRACHELOSPERMUM (Star Jasmine). As if this long name were not enough it is sometimes called *Rhynchospermum*, but notwithstanding these horrible names the species *T. jasminoides* is a thing of beauty, being useful for a cool conservatory climber. It bears very beautiful clusters of pure white flowers. It has persisted out of doors at Washington for many years, but in a sheltered position on a wall.

Propagation. Well ripened growths must be used as cuttings, but they must be rooted in a cool propagating house.

WISTARIA. *W. sinensis*, the Chinese Wistaria, flowers before the leaves are fully expanded. Old and floriferous plants have a gorgeous appearance when in full bloom. It may be grown as a standard trained to a stout post sunk in the ground, or as a vine for arbors, etc. There are several varieties of this species: *W. s. flore-pleno*, having double flowers; *W. s. macrobotrys*, a variety with very long and light colored racemes. *W. frutescens* is a native species, flowering later than the Chinese plant.

Propagation. Propagation is effected in various ways. The plants, as a rule, set seed freely, but the seedlings are apt to turn out shy bloomers. Seedlings of *W. frutescens* may be used as stocks on which to graft *W. sinensis* and its forms. The operation should be performed while the plants are dormant in March or April. The long growths may also be layered in Midsummer, allowing them to remain till well established.

CHAPTER XIV

Ferns and Lycopods

GREENHOUSE FERN CULTURE

Soil. This should be of a porous nature, through which water will pass freely. Small plants from spores will need about two parts leaf soil and one each of loam and sand. Loam, whenever used, should be fibrous, well broken up and not sifted. For plants in pots larger than 4-inch, leaf soil, loam and sand, in equal parts, will be a safe compound. Some Ferns, notably *A. Farleyense*, are benefited by having some rotted cow manure mixed with the soil. Large plants, and those which have to remain in the same pots for any length of time without shifting, should have less leaf soil and more loam. But most of the species thrive in a variety of soils. The usual time for potting large plants is before starting into growth; but rapid growing, small plants should be shifted into larger pots as they need them.

Summer Quarters for Cool House Ferns. Many Ferns used during Winter as decorative plants will be found to put on a vigorous growth in frames during the warm months. Select those frames with a northern exposure, with the sashes tilted to give an abundance of air. The pots may be plunged or placed on some material capable of giving off considerable moisture. The plants may be kept in this structure till cool weather. Among the kinds which may be thus treated are: *Pteris Victoriae*, *P. cretica albo-lineata*, *P. Mayii*, *P. serrulata* and its many forms, *P. tremula*, *P. hastata*, *Onychium japonicum*, *Aspidium capense*, *Adiantum Capillus-Veneris*, *A. formosum*, *Cyrtomium falcatum* and *Dicksonia antarctica*. In Winter a minimum temperature of 45 degrees will keep all of the Ferns named above in healthy condition. For the more tender kinds 10 to 15 degrees higher will be necessary.

Shading. Some Ferns, such as *Cheilanthes lanosa (vestita)* grow in dry places in the full sun, but the vast majority thrive only under conditions exactly the reverse. In Winter the very thinnest shade will be sufficient, and from the 1st of April to the end of September it should be heavy enough to intercept the sun's rays.

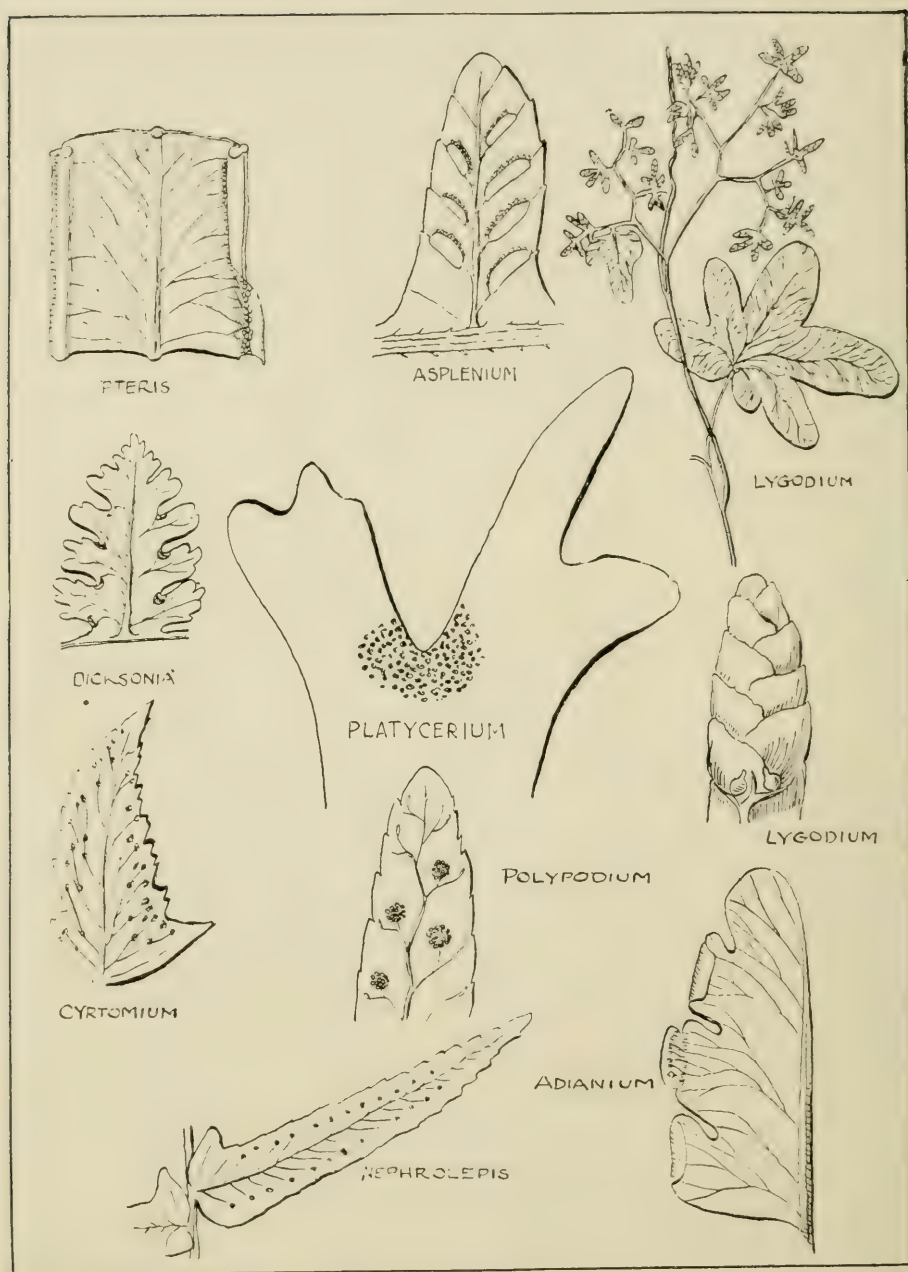


FIG. 22—CHARACTERISTIC SPORE-BEARING PARTS IN VARIOUS GENERA OF FERNS

Preparing Soil for Fern Spores. The greatest hindrances to raising Ferns from spores are the lower forms of plant life ever present in the soil, and very often in the water. These consist of Mosses, Liverworts and the various confervoid growths. Many of them, owing to the favorable conditions presented, vegetate as quickly as the spores of the Ferns and grow into a mass, choking the prothallus in the first stages of growth. The only means of getting around this difficulty lies in sterilizing the soil, or, at least, that part of it on which the spores are to be sown; and this can only be done safely by subjecting it to a temperature sufficiently high to kill all plant organisms, by baking, steaming or boiling. The last method will be the most available in the majority of cases. The soil may be boiled for 15 or 20 minutes, and afterward poured into wide flat boxes to dry. Shallow pans are the most convenient in which to vegetate the spores; they should be well drained with potsherds and these covered with a layer of sphagnum. The kind of soil to be used is of little importance, provided it be porous and free of vegetable organisms. Loam, leafmold and finely broken brick, in equal parts, make an ideal mixture. Press it firmly and give water always by sinking the pan up to the rim in a vessel containing water.

Gathering and Sowing Spores. Many failures in germinating some of the rarer kinds of Ferns may be set down to harvesting the spores at the wrong time. They should always be gathered with the aid of a hand magnifying glass, which will show when the cases are about to burst. Cut off the entire frond, or as much as may be wanted, and put between sheets of white paper to dry. In a day or two the spores will have fallen from the frond; if not, a gentle rubbing between the fingers will release them. They should then be scattered on the surface of the soil in the pan, taking care to sow very thinly, as they are very liable to dampen off when the prothalli are too close together. Cover with a pane of glass and put the pan in a shaded frame, or in a heavily shaded part of the greenhouse. When the prothallus develops, and just as the first tiny leaves appear, the glass covers may be removed, to harden the seedlings a little. A day or two after they may be pricked off into other pans of soil, taking one small patch at a time on the end of a knife blade and merely pressing them into a previously made cavity on the surface of the soil. They may then be watered through a fine rose.

Viviparous Ferns are those which develop bulbels along the midribs or on the lateral branchlets of the fronds, thus providing a

ready means of propagation. *Polystichum angulare*, *Asplenium bulbiferum* and *Woodwardia radicans* are good examples. There are also several other well known Ferns which possess this peculiarity. To increase Ferns by this means sink the pots up to their rims in a suitable mixture of soil to enable the fronds which are provided with bulbils to be easily pegged down, so that plantlets may be encouraged to develop roots quickly. When they have made a sufficient quantity to enable them to become self supporting they may be separated from the frond and potted separately into 2½-inch pots, or, if too small for pots, they may be pricked off into boxes or pans.

Insect Enemies. If the plants are not subjected to adverse conditions, such as too high a temperature, or insufficient moisture in the air or at the roots, they will seldom be attacked by insects. The mealy bug, thrips and brown scale are sometimes troublesome. Scale is not easy to remove, and the only efficacious method is to use a sponge and water. For the other insects fumigation or vaporizing may be resorted to, or, if only a few plants are affected, they may be laid on their sides and the insects removed by using the hose. Slugs are the greatest enemies of the Ferns, and a close watch should be kept for them. Various methods are employed to capture them, such as a board smeared on the under side with lard, cabbage leaves, and sliced turnips, or potatoes laid among the plants; or by using camphor among the pots, and air slacked lime on and under the benches. If the slugs are numerous, hand picking should first be resorted to. They feed at night and rest during the day. They will usually be found in the angular space beneath the rims of the pots.

HARDY FERNS

Northern exposures and moist places always suggest ferns. They are usually somewhat fragile and must be protected from high winds. They usually need an abundance of water, but prefer good drainage. Furthermore, they should be planted where water will not continually drip upon them. They are especially successful under trees where they take care of themselves nicely. They should be transplanted in early Spring or Fall—those in exposed places better in Spring. They may be planted in clumps of all of one species or they may be mixed. Among rocks, on a slope, is a very good place for them. They vary in height from 4 inches to 4 feet. Ferns possess creeping underground stems; some are deep, others

are merely surface creeping; a few have thick, upright stems, which are hard to pull up.

The soil that ferns will like varies greatly. The best method of knowing what soil they need is to note where they grow naturally. In general, most Ferns like a deep, rich, not too heavy soil—better with little peat in it. In their native habitat they have few or no enemies, but in the garden they are attacked often by wood lice, slugs, snails, caterpillars and the grub of the daddy longlegs.

There are many sorts suitable for outdoor culture. The following are most common and hardy:

Adiantum pedatum (Maidenhair): Prefers well drained, light soil. It has a poor color when grown in sun.

Aspidium (See *Dryopteris*).

Asplenium acrostichoides: Moisture; some shade; endures sunlight if in cool situations. *A. angustifolium*: Avoid the removal of old fronds. New crop springs up and weakens the plant. *A. Filix-femina* (Lady Fern): Good, rich loam, moist. Excellent, well formed fronds, which are very variable. *A. pinnatifidum*: A small evergreen fern found in depth of glens. Useful for planting between stones. *A. Trichomanes*: A rock garden plant. *A. platyneuron* (Ebony Spleenwort).

Camptosorus rhizophyllus (Walking Fern): Prefers dry ledges.

Cheilanthes lanosa: Prefers deep shade. *C. tomentosa*: Prefers less shade and more moisture.

Cystopteris bulbifera: Plant in shade on moist bank. *C. fragilis*: Fronds die in August.

Dennstaedtia (*Dicksonia*) *punctulobula* (Hay-scented Fern): Heavy growth. Grow for cutting in Summer.

Dryopteris (*Aspidium*) *Boottii*: Does not need Winter shade. *D. cristata* var. *Clintonianum*: Swampy ground. *D. Filix-mas* (Male Fern): Rich soil; deep shade. *D. Goldieana*: Cool, rich soil. Grows in acid soil or leafmold. *D. marginale*: When transplanted in full leaf the plants rarely survive. Likes a rich; moist soil and deep shade. *D. noveboracensis*: Not good for cutting. Easily transplanted. *D. spinulosa* var. *intermedia* (Spinulose Shield Fern): Good in wet, and under trees as well. *D. Thelypteris*: Partial shade in marshes.

Lygodium palmatum (The Climbing Fern; Hartford Fern): This Fern is difficult to establish. It is moisture loving.

Onoclea sensibilis (Sensitive Fern): Wet ditches and rich, moist soil; partial shade. *O. Struthiopteris* (Ostrich Fern): Burns in full sunshine.

Osmunda cinnamomea (Cinnamon Fern): Moist, rich. *O. Claytoniana* (Interrupted Fern): Move while dormant. *O. regalis*. Peaty; branching; edges of brooks.

Polypodium vulgare (Common polypody): Can be planted upon the ledges of gorges.

GREENHOUSE FERNS AND LYCOPODS

ADIANTUM (Maidenhair) is one of the most important genera of ferns, as it contains several of our most popular decorative plants. There are nearly a hundred known species; many of these are in cultivation, besides numerous varieties and forms. There is great diversity of form in the fronds of different species. *A. reniforme* is simple and kidney shaped. Among others *A. macrophyllum* and *A. peruvianum* have the fronds simply pinnate. In the greater number of species the fronds are much branched. Where large collections of ferns are grown it would be a difficult task to select the most beautiful and interesting kinds, as this genus above all others does not possess a single species but what is worthy of a place in



ADIANTUM CROWEANUM



ADIANTUM CALIFORNIA

Courtesy Henry A. Dreer, Inc., Philadelphia, Pa.

the fernery. For decorative purposes *A. cuneatum* is more extensively grown than any other species. There are several well marked forms. *A. c. Croweanum* has very large fronds. *A. gracillimum* has the segments much smaller than in most species. *A. c. mundulum* is a dwarf garden form, well suited for using in fern dishes. *A. c. variegatum* has the pinnules faintly marked with creamy white. *A. hispidulum* (*pubescens*) is a species much used in a young state, as it can be got up in quantity very readily.

Plants in 2- and 3-inch pots raised from spores have a very different appearance from those which have reached the adult stage. *A. caudatum* and *A. lunulatum* are well suited for planting in hanging baskets. Young plants are produced at the ends of the fronds, and when planted out among rocks in a greenhouse they soon cover a large space. *A. Capillus-Veneris* is one of the hardiest of the genus, but it has a very wide geographical distribution. It is the most useful of all ferns for growing on damp greenhouse walls.

There are numerous varieties; *A. C.-V. imbricatum* has very large pinnules; it is shy in producing spores, but is easily increased by division of the rhizomes in the latter part of March. *A. tenerum* makes beautiful specimens in 5-inch pots, but it is a little tender for decorative work. Adiantum fronds will keep a much longer time after they are cut, if they be submerged in water for a few hours, than if used direct from the plant.

Among the tall growing species *A. trapeziforme* is one of the most ornamental. It may frequently be met with in collections, and has fronds 3 to 4 feet long. *A. t. pentadactylon* is a well marked variety and should always be included in large collections; it stands well as a decorative plant. *A. t. Sanctæ-Catherinæ* is a dwarf variety, with the segments deeply cut. This species and its varieties are best increased by division of the crowns before starting into growth. Success in growing the important commercial fern *A. Farleyense* depends to a great extent on making a proper start with the small plants. It is labor lost in trying to make a healthy plant out of an unhealthy one, or from one which has got a setback from some cause, unless they be knocked out of the pots and split up into small pieces—the smaller the better, provided there are a few small fronds attached to each piece and a probability of their making new roots. A variety, no doubt a sport or hybrid, which is attracting the attention of many florists is California. It produces a great number of fronds which stand up nicely when cut.

Propagation—Spores. *A. cuneatum*, *A. pubescens* and many other species vegetate very quickly from spores. The principal points to be observed are to have the soil free from the lower forms of plant life, such as mosses and liverworts. Sow the spores very thinly. Keep the pans in which they are sown shaded from the sun, and the pans covered with glass until the first fronds appear. During the process of germination the soil should not be watered from above, but by sinking the pans up to the rims in a pail of water. The spores will germinate in almost any kind of soil, but it should be somewhat porous and well drained. Sow in early Spring. The small heart shaped growth which comes from the spore is known as the prothallus or the sexual stage. The male and female organs are on the under surface. After fertilization takes place the young fern develops.

Propagation by Division. *A. cuneatum* and its varieties are the Maidenhair ferns most largely grown. These and their allied species which have become unsightly through cutting the fronds,

on being repeatedly used in decorations during the Winter season, should, while in a dormant state, have all the fronds cut off and be placed in the coolest house, where they should be allowed to rest as long as possible. The appearance of the young fronds will serve as an indication as to how the plants should be split up previous to repotting. Put the pieces in 5-inch pots. In potting use a loam which is apt to get hard after watering; this, with a little sand and leaf soil, will give good results. In starting the plants they will not suffer by having the house almost without shade. *A. Farleyense* does not produce spores as most kinds of ferns do. The reason is because it is not a species, but merely an unfertile variety of a species said to be the well known *A. tenerum*; consequently the only method of propagation lies in dividing the old plants. Some growers split the crowns and pot the growing points in thumb pots, placing them in a frame or close shaded house. This method is not always satisfactory, for unless the points have fairly good live roots to start with, or show signs of immediately making fresh ones, their struggle for existence is apt to be a pretty tough one. The first batch may be started about the end of January or first half of February. Old plants from which the fronds were cut earlier in the season, and which show little colonies of small fronds, are the best for the purpose. Wash every particle of soil from the roots, when it will be found there is a considerable quantity of dead but hard, wiry rhizomes just beneath the surface of the soil. This material, if potted up with pieces, hinders their growth and should be removed. Select only the rhizomes which have life in them and which have a frond, however small, or a piece of frond attached. The work of separation should be done with the aid of a sharp pointed pair of scissors. Next put the pieces in a mixture of sand and moss, the latter rubbed through a No. 8 sieve; have the materials in equal parts. Water should be given very sparingly. To start the pieces into growth under the most favorable conditions they ought to be covered with glass until new roots and fronds push out. They may then be potted into 2-inch pots.

ASPIDIUM. (See *Polystichum*, page 399.)

ASPLENIUM. A very large genus. Only a very few of the species are extensively grown, but none of them is on the short list of the best decorative Ferns for florists. *A. nidus*, the Bird's Nest Fern, a native of Australia, is a striking species with very large, simple leaves. It must have perfect drainage, rather rough and fibry soil, and a stove temperature.

BLECHNUM (Lomaria). The Ferns formerly known as Lomarias are not classed under this genus. *B. gibbum* is a miniature Tree Fern forming very graceful rosettes of simply divided leaves. Of this species there are one or two handsome forms. *L. g. Belli* has the points of the pinnæ beautifully tasseled. *L. g. robusta* is of a robust growing nature. A species closely allied to *L. gibbum*, known as *L. ciliata*, has shorter and stouter fronds. The plant is quite as useful and as easily raised from spores as *L. gibbum*. The plants are useful even in a very small state, as the foliage is different from that of most other Ferns grown in quantity for decorative purposes.

Propagation. Old plants produce fertile fronds in abundance, and if the spores are harvested and sown at the proper time, they vegetate very quickly. By this method of increase, plants in 5-inch pots may be produced in 12 months from sowing.

CIBOTIUM. The Cibotiums are Tree Ferns of which there are several handsome species. *C. Schiedeii* and *C. regale* are natives of Mexico. The fronds are of a light shade of green and very much divided, those of young plants arching gracefully. It stands well in a dry atmosphere.

Propagation. Young plants come readily from spores. Old plants sometimes make numerous growths at the base of the stem. If these are taken off with a few roots attached and put in the sand bed for a few weeks they make specimen plants very quickly.

CYRTOMIUM (Holly Fern). *C. falcatum*, together with *C. Fortunei* and *A. caryotideum* are among the hardiest of the Ferns used for decorating, for which purpose they are much grown. *C. f.* var. *Rochfordianum* has more deeply cut foliage than *C. falcatum*. The coolest house will do for the plants after they are of the requisite size. The fronds are simply pinnate, the pinnules resembling, to a certain extent, the leaf divisions of the Fish-tail Palm, *Caryota urens*.

Propagation. Young plants are raised from spores.

DAVALLIA (Rabbit's Foot Fern). A genus of Ferns having scaly rhizomes which usually creep along the surface of the soil and send out roots from their under surfaces. Of the few species grown *D. fijiensis* var. *plumosa* is one of the most ornamental, having very finely divided fronds. It must be grown in a warm house. As it is not a deep rooting plant pans or baskets should be used according to the purpose for which the plants are wanted. *D. bullata*, *D. pentaphylla*, and *D. dissecta* are well adapted for baskets. Those



CYRTOMIUM ROCHFORDIANUM

In 4-in. pots. Useful as table fern and for filling in.

made of wire should be selected, so that the rhizomes, as they lengthen, may be pegged against the side. *D. parvula* is an exceedingly pretty dwarf growing species for a warm greenhouse. *D. Mariesii* is the species used in making up "Fern Balls." It is deciduous and should be kept moist enough in Winter to prevent the rhizomes from shrivelling. *D. pallida* (*Mooreana*) is a desirable plant for house decoration, but is not grown in quantity, owing to the difficulty of getting up a large stock within a reasonable time. Those in a starved condition make the best stock plants.

Propagation. Spores sown in a mixture of moist sphagnum, sand and leafmold grow readily. The large plants while dormant may be divided.

DICKSONIA. The stems of *D. antarctica* are sometimes imported in a dormant state. When placed in a cool, moist house in pots only large enough to accommodate them, they usually start into growth.

Propagation. Young plants are raised from spores sown in a cool, shaded greenhouse. They sometimes germinate freely sown

on the stems of the old plants. The fronds are of a leathery texture, and the plants stand much rough treatment.

DRYNARIA. In the Washington Botanic Garden the late W. R. Smith built a small but ornate rockwork in one of the show houses leading from the Palm house about 40 years ago, the idea being to grow ferns in it. *Drynaria quercifolia* was one of the number and it has continued in splendid condition since that time. The stems adhere to the stone work with the aid of small roots. The *Drynaria* is one of the most graceful of the climbing ferns, especially where it has a chance to get a hold upon stonework.

Propagation. The species is increased by putting small pieces of rhizome in leafmold and sand, using 4-inch pots.

MICROLEPIA (Davallia). The *Microlepias* resemble the *Davallias*. *M. hirta* var. *cristata* is one of the handsomest of crested Ferns, capable of being grown into very large, symmetrical specimens. To have it at its best it needs a warm temperature. Water should be kept from the fronds, as they are quite hairy and are apt to turn brown when kept wet.

Propagation. Increased by division.

NEPHROLPEIS (Boston Ferns). The species and forms are for the most part plants with tough, leathery fronds, enabling them to be used with little injury for decorating or house plants. Several varieties are largely grown. The most popular are forms of *N. exaltata*. *N. e. bostoniensis*, the Boston Fern, is an old and deservedly popular plant which is very extensively employed as a decorative plant. Large specimens are well adapted for placing on pedestals, or hanging from the roof of a large conservatory. Within recent years many remarkable wavy and plumed varieties of this fern have made their appearance and are much grown as decorative plants; these are known as *Pieroni*, *Scottii*, *Amerpohli*, *Whitmani*, *Scholzeli*, *elegantissima*, *Goodii*, *Roosevelt*, *Teddy, Jr.*, *muscosa*, and others. *N. cordifolia*, when well grown, is an elegant decorative subject. The typical form is much smaller than the above mentioned species and varieties. The fronds are narrow and the leaf divisions close together, but, like some of the others, it varies much. One of the varieties produces tubers; the fronds in this case are large and may be mistaken for those of *N. exaltata*. *N. c. pectinata* is a well known variety, having the fronds narrow and drooping. When matured it is usually grown in baskets suspended from the roof of a greenhouse. Useful specimens

may also be grown in 5-inch pots. *N. acuminata* (*davallioides*) is somewhat coarse in growth. It needs careful handling while the fertile fronds are developing. Moderate sized specimens do not show this plant at its best, as it is the very long, fertile fronds on plants several feet across which make it attractive. The plant known as *N. davallioides furcans* is a crested form. When planted out on benches it gives off plants from runners in the same manner as the Boston Fern, but not so plentifully. Old specimens may be divided, and the pieces put thickly together on a bench, in leafmold and sand, to make a little growth before potting. *N. biserrata* (*acuta*) is a stout growing and distinct species; the fronds are sometimes 16 inches broad and from 2 to 4 feet long. It makes but few fronds when compared with some of the others. It must have abundant root room.

Propagation. Many of the sorts are propagated by division of old plants; others produce runners which root and produce young



NEPHROLEPIS TEDDY, JR.
Courtesy Brooklyn (N. Y.) Botanic Garden.

plants; for this purpose the plants are set into greenhouse benches so that the runners have an opportunity to root.

ONYCHIUM. Of this genus two species are commonly grown for decorative purposes; the fronds are very much divided. *O. auratum* is the largest, but *O. japonicum* is the handsomest.

Propagation. Both are easily increased from spores; or the old plants may be divided, but only to make large specimens.

PLATYCERIUM (Stag Horn Fern). From their wonderful resemblance to the antlers of a stag well grown plants of the *Platyceriums* never fail to attract attention. The species called *P. grande* is the most striking of the number. A native of the northern part of Australia it needs more heat than most of the others. In *P. angolense*, the fronds are not divided like a stag horn. *P. Wallichii*, *P. æthiopicum* (catalogued as *P. Stemmaria*), *P. Hillii*, and *P. alcicorne* are also frequently seen.

Culture. While they succeed pretty well in pots they do better and look more natural when grown on blocks of wood. Some forked limbs of trees should be cut up on which to fasten the plants. The pieces should be in the neighborhood of 18 inches in length. Drive in a few nails here and there; place some rough peat and moss against the wood; put the plant in position and wire it firmly, packing in portions of the peat and moss wherever possible. Most sorts, except *P. alcicorne*, like a warm house.

Propagation. *P. grande* can only be propagated in quantity from the spores, which are found in a large mass underneath the primary division of the frond. Raising young plants in this way is not a difficult operation, but one that requires lots of patience. A pan should be prepared containing fibry peat, chopped fine; add a liberal quantity of finely broken brick, charcoal, and coarse sand. The pan should be placed in a flat of water so that the mixture may derive moisture from beneath. Water should never be given overhead, as germination depends, to a great extent, on the spores remaining in the same spot until the prothallus begins to form. Most other sorts increase rapidly from the roots, many bud like processes forming on the surfaces and sending up tiny leaves. These young plants may be removed when an inch or two high, and potted singly in small pots.

POLYPODIUM. This is the largest genus of the order, and includes many plants which have long been known under other generic names. These names are in common use, and it is likely

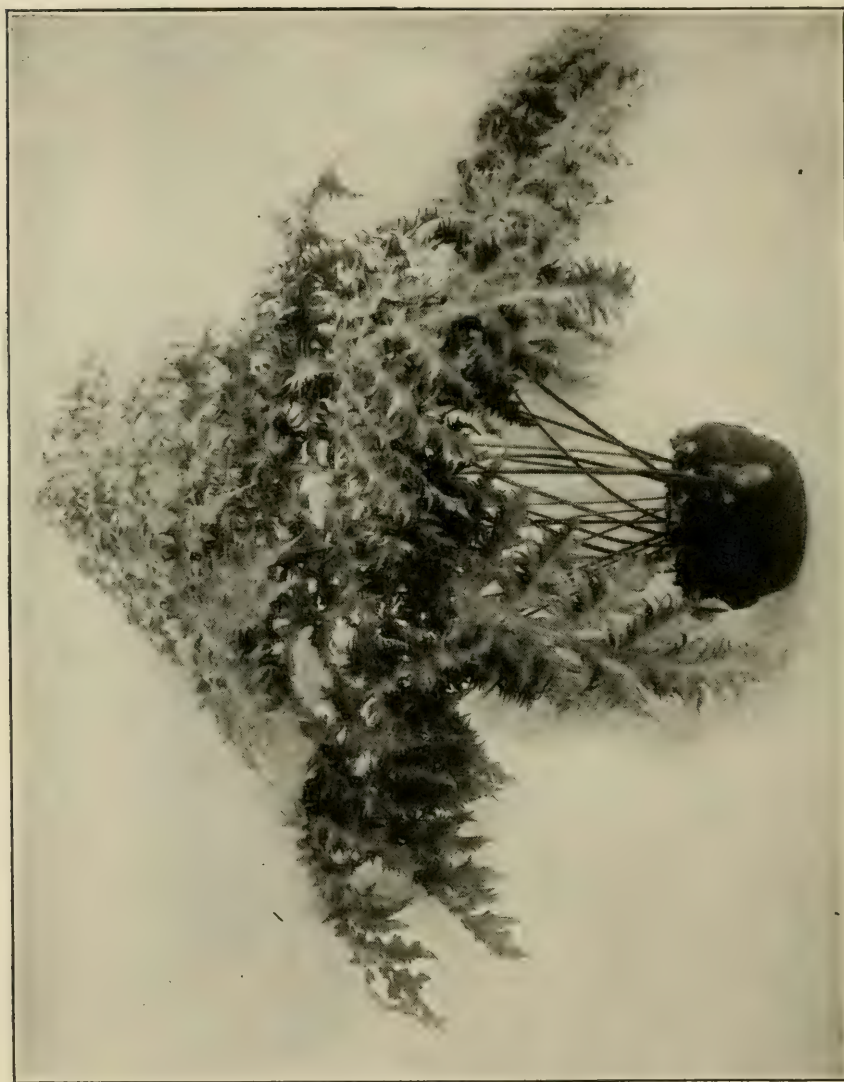
that they will continue to be employed for a long time. Some of the better known are *Campyloneuron*, *Cryptosorus*, *Drynaria*, *Goniophlebium*, *Goniopteris*, *Lepicystis*, *Niphobolus*, *Phegopteris*, *Phlebodium* and *Pleopeltis*. There is a great number of exceedingly beautiful plants among the species. The varieties, especially those of the common Polypody, *P. vulgare*, are among the handsomest of hardy Ferns, but they are not so much grown in America as in Europe, where they do grandly in outdoor ferneries.

P. (Phlebodium) aureum should be more grown for decorative purposes, as it will stand a dry atmosphere and is very graceful. The fronds are from 2 to 4 feet in length, and from 9 to 18 inches broad, simply divided. It grows most luxuriantly among Fern root, peat and moss. There is a form called *P. a. sporadocarpum* with fronds very glaucous, almost blue, usually growing from 12 to 18 inches high—a handsome plant, showing up well under gaslight. It needs more heat than the type. *P. a. Mandaianum* is a superior variety with wavy leaves. The spores on a small frond will raise thousands of plants. They should be sown on very finely chopped Fern roots mixed with screened moss. The rhizomes may also be divided.

P. Phymatodes is a rhizomatous species of very rapid growth, with exceedingly graceful leaves. The fronds are deeply pinnatifid, the fertile ones narrowest. One of the uses to which this Fern may be put is in training against damp walls or on the dead stems of Tree Ferns. It is easiest propagated by taking pieces of the rhizomes with fronds attached and pegging down in 4- or 5-inch pots of sandy soil.

P. (Drynaria) rigidulum is a species too seldom seen. It has two kinds of fronds very different from each other; the barren ones are about 9 inches in length, divided half way to the midrib, forming blunt lobes. The fertile ones reach a height of from 2 to 4 feet, and are 12 to 18 inches broad. A very handsome plant for collections.

P. (Goniophlebium) sub-auriculatum makes one of the finest basket plants for a warm greenhouse. The fronds are several feet in length and drooping. This Fern is not difficult to grow, provided it be given a fibrous soil and an abundant supply of water during the period of growth. It is helped along wonderfully by adding to the soil some finely crushed bone with the minute particles washed out, only saving the rougher material in the process of washing. This substance, by the way, is of great service as permanent food for many of the Ferns, but the deleterious matter must be removed by washing.



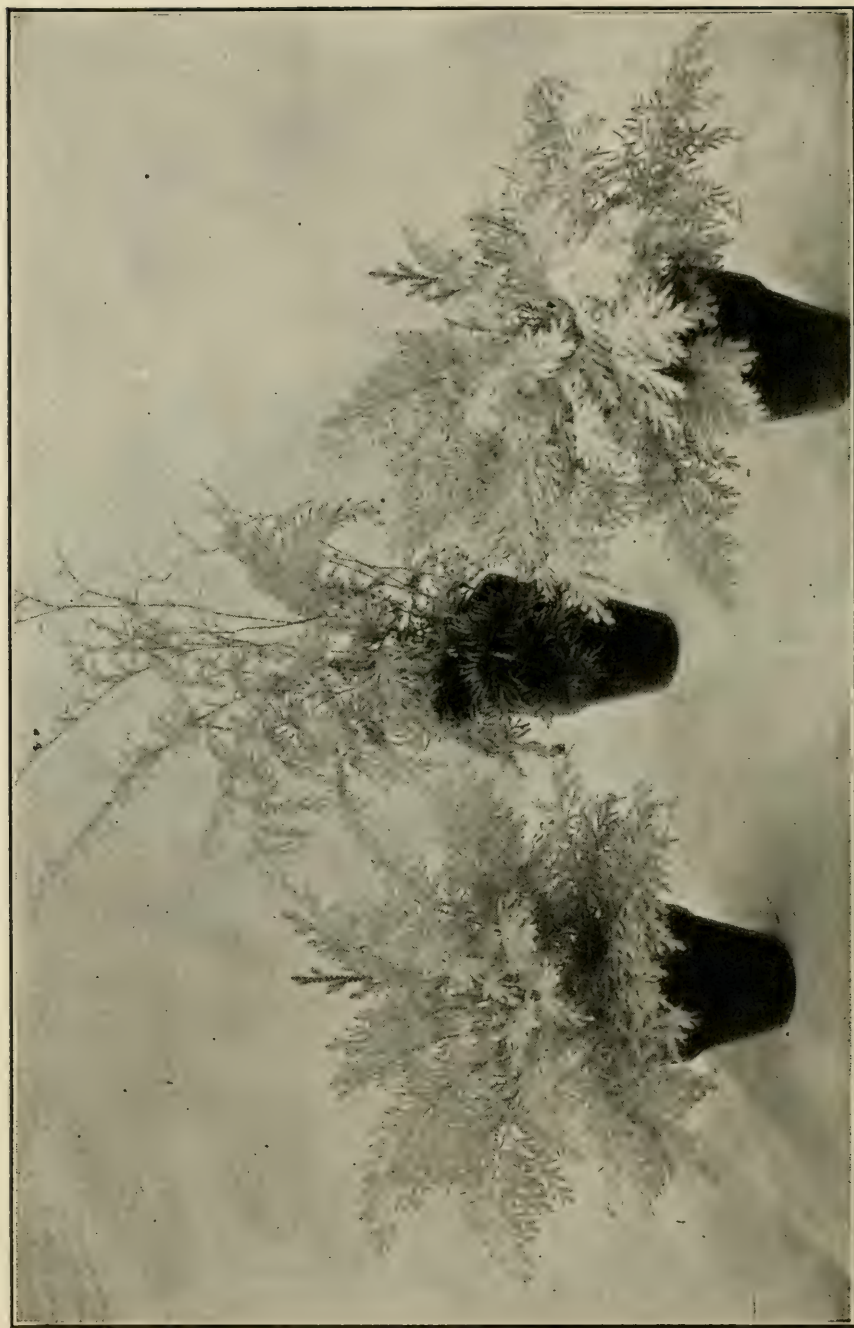
POLYPODIUM GLAUCUM, VAR. MANDAIANUM.—See page 396.

P. (Niphobolus, also called *Cyclophorus*) *lingua*, from Northern India and Japan, is almost hardy and one of the best for house culture. There are three forms: one variegated, *P. l. variegata*, another crested, *P. l. corymbifera*, the third having the largest fronds. The fronds are undivided, very feathery in texture and remain in good condition for more than a year. All of them are very readily increased by division.

P. Heracleum and *P. conjugatum* are suitable for a warm conservatory. When well grown they are odd and attractive. The very thick rhizomes grow on the surface of the soil and accommodate themselves in a wonderful way to a limited rooting area by growing in coils.

POLYSTICHUM (Aspidium). There are many species cultivated indoors, most prominent among which are *P. Tsus-sinense* (incorrectly spelled *tensemense* in catalogues), a miniature fern for fern dishes. *P. capense* is a good, hardy, ornamental Fern for decorative purposes, one that is cheaply raised and not easily spoiled. From a well filled 6- or 8-inch pot several dozen plants may be raised within a few months. It requires but little heat in Winter. *P. proliferum* is a species which produces small plantlets upon the fronds.

PTERIS. There are many good decorative plants in this genus, all of which are easy to propagate. Most of them may be grown in ordinary greenhouse temperature. Of *P. serrulata*, much used in a small state, there are numerous forms, some of which have beautifully crested fronds and others variegated. *P. cretica albo-lineata* is one of the finest of all variegated Ferns. The barren fronds are nearest the base of the plant; they are shorter and broader than the fertile ones. A broad band of creamy white occupies the middle of each leaf division. This Fern comes true from the spores. *P. quadriaurita*, a variable species. The most useful form is known as *P. q. argyræa*, having a white mark down the center of each frond—a very useful variety in a small state. *Pteris tremula* is best for using in pots not under 5-inch. It is one of the quickest raised from spores. There are crested forms. The one named *P. t. Smithiana* has been in the trade for several years. *P. Wallichiana* and *P. inæqualifolia* (the latter evidently related to *P. semipinnata*) are coarse growing. *P. hastata* and *P. macrophylla* have very dark green fronds. Both are very liable to insect attacks, unless grown cool. They are both useful in 2- and 3-inch pots.



SELAGINELLA EMMELIANA AT RIGHT AND LEFT; S. WILDENOVII IN CENTER

SELAGINELLA. Although not related to Ferns, some of the species have a striking resemblance to these plants. Low growing species commonly grown to cover the soil under benches or grown in flat pans are *S. denticulata*, *S. Kraussiana*, *S. Emmeliana* and *S. Martensii*. *S. Kraussiana* is a dense growing moss like species, much used for covering the soil in pots in which other plants are growing, in Fern dishes, and for the borders of conservatory beds. *S. K. aurea* has yellow foliage. *S. K. variegata* is green and white. In propagating this species and its forms it should not be broken up into little tufts and potted, as is usually the case. Take single growths and put, say three of them, in a 3-inch pot; in a short time they will develop enough growth to cover the soil. *S. Emmeliana*, one of the best for supplying small plants for mixing with Ferns, is increased by breaking up the mature fronds into small pieces, and scattering these on the surface of a box or bed of sandy soil, which should be kept moist and shaded from the sun. Every small piece will make a plant. *S. Martensii*, a Mexican species, is one of those most frequently grown. It is exceedingly easy to propagate, as long aerial roots are made from the stems. Cuttings, say about 4 inches in length, will root well if put in small pots and kept close; or to fill large pans, and have them present a well furnished appearance in a short time, root the pieces in sand, afterward putting directly in the pans. An interesting species, *S. lepidophylla*, is the well known "Resurrection Plant," which, when dry, curls up into a ball, and which uncurls when placed in water. *S. cæsia arborea* is a climbing species very suitable for rambling over rustic work in a moist conservatory. Where its aerial roots are allowed to fasten themselves to suitable material it grows into a dense, irregular mass of lovely bluish green foliage. *S. viticulosa* grows about 8 inches high, is always bright green. An easily divided plant and useful in a small state. *S. erythropus* is a useful species with reddish stems reaching a height of about 9 inches.

Culture. Their cultural requirements are almost similar to those of the Ferns. They do best in shade, and with a few exceptions they need a rather warm atmosphere, especially while making their new growth.

Propagation. They may be propagated from spores, division of the crowns, or from cuttings. Propagation by spores is seldom attempted, as dividing the plants and rooting from cuttings will give an abundant supply.

CHAPTER XV

Water Plants—Waterside Plants

Plants Adapted to Waterside Planting. In order to give a naturalistic appearance to the water garden some plants, especially perennials, should be planted in the moist soil bordering the pond. The following perennials are useful: *Acorus* (The Sweet Flag), *Arundo* (p. 415), *Caltha* (Marsh Marigold), *Cimicifuga*, *Cyperus* (p. 417), *Eupatorium*, *Iris Kaempferi*, *I. sibirica*, *I. pseudo-acorus* and *I. versicolor* (p. 193), *Lobelia* (p. 201), *Lythrum* (p. 203), *Mertensia* (p. 203), *Monarda* (p. 203), *Myosotis* (p. 204), *Sarracenia* (p. 214), *Saxafraga* (p. 214), *Thalictrum*, *Typha* (Cat-tail), *Zizania* (p. 422.) For shrub planting use several of the following: *Azalea canadense* or *viscosum* (p. 295), *Kalmia angustifolia* (p. 318), *Chamædaphne*, *Ledum*, *Andromeda*, *Clethra*, *Chionanthus* (p. 301), *Magnolia glauca* (p. 323), *Vaccinium corymbosum*, *Cornus stolonifera*, *Sambucus racemosa* (Red Elder), *Salix* (Willow) and *Viburnum cassinoides* (p. 336).

Labels for Water Plants. Labels for pots under the surface of the water, if of the ordinary wooden kind, only remain in good condition for a short time, and then the writing becomes obliterated. With the constantly increasing number of *Nymphæas* and *Nelumbiums*, one must be well acquainted with the names of the species and varieties to tell them by their leaves, but when in a dormant state it is impossible to tell some of the kinds from others. A simple method of getting around this difficulty is to have labels made of strips of sheet copper, with a number stamped across the top, the number to correspond with a numbered list of the species and varieties kept in a book. The numbers and names should also be written on a piece of board and nailed up where it may be conveniently referred to. These labels last for years, and may be used as often as necessary. In Water Lily ponds, whether the plants are labeled above water or not, those intended to be removed to their Winter quarters should have the name secured by nailing a strip of the copper along the top of a stout wooden label, with the number

belonging to the kind punched on the copper. With copper and punches conveniently at hand no more time will be used than in writing an ordinary label. This method is a safe one also, where a permanent label is desired for preserving the names of outdoor vines, shrubs and trees.

ACORUS (Variegated Sweet Flag). A grassy looking plant, with finely marked leaves. It is well suited for growing on the margins of artificial lakes; few other places will keep it in a healthy state unless the soil be moist and partly shaded. The commonest in cultivation is the *A. calamus variegatus*. The leaves are striped deep yellow when young, fading to a paler color later in Summer. *A. gramineus variegatus* is an exceedingly handsome little variegated plant, growing only a few inches high. It will thrive in much drier soil than the first named species. It makes a great number of grassy looking growths, so that division is an easy matter at almost any time.

Propagation. It should be propagated by division of the rhizomes as growth commences in Spring.

APONOGETON (Includes Ouvirandra). *A. distachyus* is not a greenhouse plant, but, where opportunities offer, it certainly should be grown as such. Out of doors it is nicely grown at the edges of Lily ponds, where it blooms all Summer. It is known as the Cape Pond Weed. The flowers, arranged much in the same way as those of the Ouvirandra, have large, showy white bracts; very sweet smelling. In its native haunts the seeds germinate on the surface of the water, forming very small tubers which, when the leaves decay, sink to the bottom of the pond and become established there. *A. (Ouvirandra) fenestralis* is the Lattice Leaf Plant of Madagascar. The leaves are skeletonized so that the veins are the only parts of the leaves. This unique subject thrives best when the leaves are near the surface of the water. The pots should be submerged from 4 to 6 inches. The temperature of the water should never be below 65 degrees, but it should be kept at least 10 degrees higher most of the time. A wide tub and one about 14 inches deep, will suffice for the plant's needs. The tub should be placed in the warmest part of the house, and shaded from the sun at all seasons. It is not particular as to soil, growing in any ordinary potting mixture. Loam, sand and a little half-rotted manure, topped off with fine sand, produce good results. When in an evidently dormant state the plant will, no matter at what season, begin to send up new leaves when given a shift, or the ball reduced and fresh soil

afforded. When the plant shows signs of going back take it out of the pot and wash most of the soil from the roots; give fresh soil, moderately rich, and replace it under water. Plants which have been growing for some time usually have several crowns. It does not do the plant any harm in the least to wash the soil from every part of the roots and divide it into several pieces, placing each part in 4-inch pots. Its greatest enemies are the lower forms of vegetation which cling to the leaves. To check these, keep the plant in total darkness for a few days.

Propagation. By division, and from seeds.

AZOLLA. *A. caroliniana* is a floating aquatic closely allied to *Salvinia natans*. The plants are very small, but increase very rapidly when growing on the surface of the water. In water of a temperature above 60 degrees F. the plants are bright green, but in lower temperatures they are partly of a reddish tinge. They should be wintered in water out of the reach of frost. They are useful for aquariums.

CABOMBA (Fish Grass). For the aquarium and small pool *C. caroliniana* is, perhaps, as commonly used as any plant. Dealers sell bunches of cuttings which only last a few weeks unless placed in soil. Unlike the *Myriophyllum*, the Cabombas are entirely submerged. They act as purifiers for the water in fish globes.

EICHHORNIA (The Water Hyacinth). *Eichhornia crassipes* may be utilized as a most attractive tub plant in the following manner: Put, say, three plants in as many 5-inch pots of rich soil; fill a tub with water and sink the pots just under the surface. Beyond wanting water to replace that lost by evaporation they will take care of themselves; the surface will become a thick mass of plants, with fresh flowers opening every morning. Although this plant floats on water naturally, without the roots being fixed in soil, it also flourishes in saturated ground at a surprising rate, keeps a fresh, green appearance, and produces myriads of flowers; it is well worth a trial for unsightly marshy spots. *E. azurea* is an interesting relative of the above, with darker colored flowers. It is useful for planting around the margins of ponds, covering quite a large water surface during a Summer's growth. Both species are easily kept over Winter by placing a few on the surface of a warm tank. The Eichhornias have become a pest in St. John's River, Fla., where they have grown so abundantly as to make the river unnavigable, but there is no danger of its becoming a pest in the North.

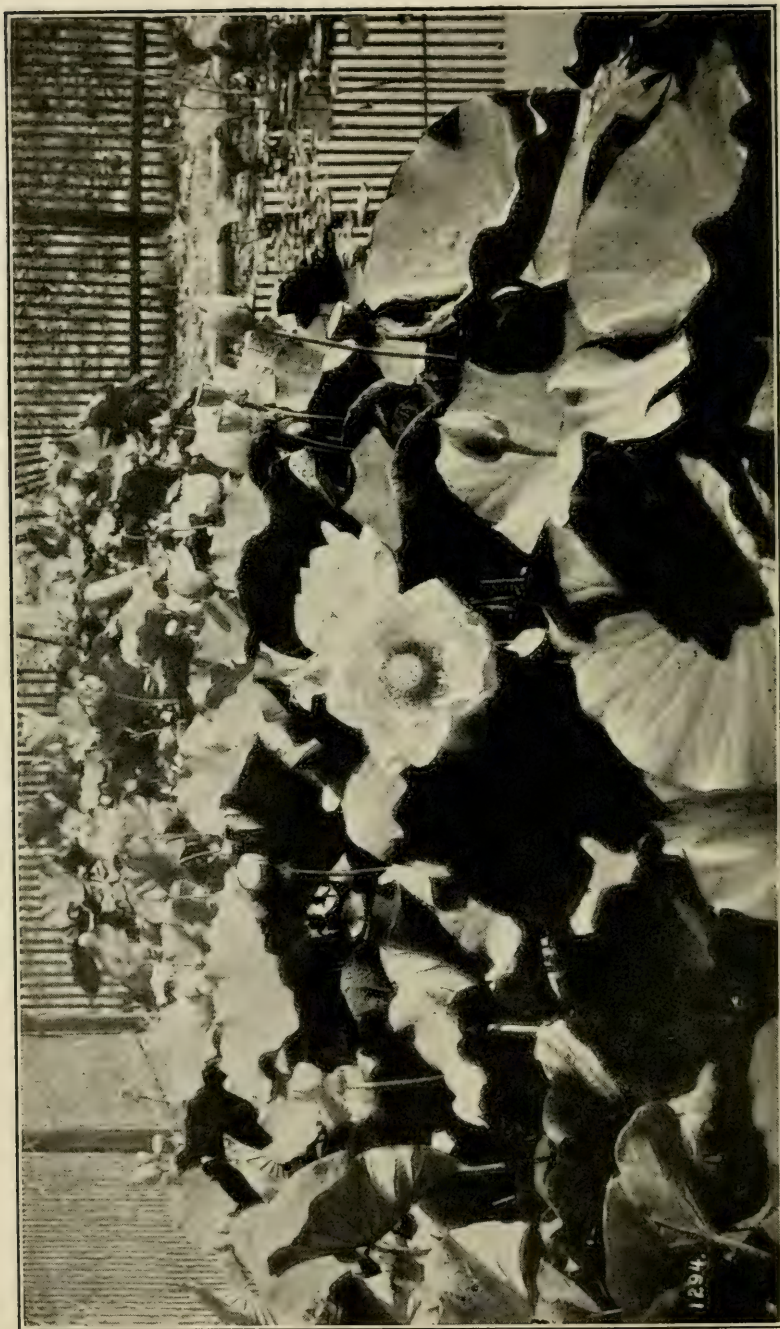
Propagation. They increase very rapidly during early Spring and are readily divided.

LIMNOCHARIS (Water Poppy). The proper name for this plant is *Hydrocleis nymphoides*, but it is commonly catalogued as *L. Humboldtii*. The species is useful for planting where the water is only a few inches deep. The flowers are yellow, about 2 inches in diameter. The plants must be wintered indoors. When grown in shallow water during Summer, it is not necessary to keep them under water during Winter. All that is required is to prepare a box of moist loam; put the plants in this, in rows, close together; give a good watering and stand the box under the bench of a warm house where it will get a fair amount of light. They will make a new set of short stalked leaves ere long, and remain in good condition for planting out in the Spring.

MYRIOPHYLLUM (Parrot's Feather). *M. proserpinacoides* as grown in Washington has been seen by millions of people for the past 10 or 15 years on the north side of the Treasury Building in the upper basin of a small fountain. A few pieces of this sub-aquatic are placed in this fountain and anchored to pieces of brick, the result being a dense mass of bright feathery growth several feet in length, making a most pleasing appearance until the arrival of frosty weather.

Propagation. They are readily rooted from cuttings placed in the mud of a pool or aquarium.

NELUMBIUM. There are at least two species, *N. speciosum* (also called *N. nucifera*) and *N. luteum*, besides several forms of the first named, differing from it principally in the colors of the flowers. *N. speciosum*, incorrectly called the Egyptian Lotus; it bears pink, red or white flowers; its forms are the best for growing in ponds and fountain basins. *N. luteum* is the American Lotus and bears yellow flowers. The latter species is often crowded out by *N. speciosum*. During Summer they make very long underground stems, and, on the approach of cold weather, form thick resting tubers at the ends of which are one or more dormant buds. Nelumbiums need an abundance of rich soil for their perfect development. When grown in a cramped space comparatively few flowers are produced. The flowers are from 8 inches to a foot across. They are borne on long, rigid stems well out of the water. The leaves have an exceedingly ornamental appearance, being peltate and standing a considerable distance out of the water. In this way they differ from *Nymphæa*. The first few leaves float the on



NELUMBIUMS

1294.

surface, but as the shoots gain strength they rise 2 and 3 feet above the surface.

Raising Plants from Seed. This is a very certain method of increasing the supply of plants, not only for planting out the same season, but as a convenient form in which to keep plants for sale. The seeds have a very hard covering, and before putting them in water this covering should be pierced either with the point of a knife or by the aid of a file. A very small opening will suffice in causing them to germinate in a few days. About the end of March sow fairly thick in a shallow seed pan, sinking it about 6 inches beneath the surface in a warm tank. After the seedlings have made the first leaf put each in a 3-inch pot. They can be planted out of these; or, if necessary, shift into 6-inch pots; in these they will pass the Summer and in the Fall form one or more small tubers.

Starting Dormant Tubers. Attempts to start the dormant tubers of *Nelumbiums* after removal often result in disappointment. The operation of digging them up and replanting has an effect upon them sufficient to prevent their breaking into growth with the same certainty that would have followed had they been left undisturbed. Especially is it a risky performance to plant out the tubers early in the season. It is well to let the tubers float on the surface of an indoor tank, or tub, on which the sun has full play; they soon begin to form roots quite freely, and when put out by the middle of May or beginning of June, according to locality, they continue to grow very luxuriantly, making even greater progress than those which have succeeded in starting outside.

Insect Enemies are not numerous; there is one moth, however, which causes great trouble, especially in the vicinity of long established colonies of the American species, *N. luteum*. This insect deposits its eggs on the leaves, and on hatching the caterpillars attack the outer edges principally, rolling the leaves inward as they develop. Another favorite point of attack is the stem of the leaf. Beginning at the top the caterpillar will eat out the interior part for several inches. In large collections it is a serious matter to attempt to combat this pest, but where there are only a few plants hand picking will prevent them doing much injury.

NYMPHÆA (Pond Lily. Water Lily). When anything like fair treatment is given most of the species and varieties of *Nymphæas* grow very rapidly and flower abundantly. There are only one or two kinds which are backward in this respect, and unfortunately they are the most handsome ones of the genus. *N.*



FIG. 23—VIVIPAROUS LEAF OF NYMPHAEA

gigantea, a light blue flowered species from Australia, and the rose colored variety of *N. alba*, are the principal offenders. The former can be managed but, not with the same treatment as is given the other blue flowered species. It is the largest and much the finest of all the species and their numerous varieties even rivaling the *Victoria regia* in size of flower. It has been grown in Washington with flowers 16 inches in diameter. It is just as easily propagated as any of the other species; plant the tubers in stiff but rich loam, preferably in 5-inch pots, and have the top of the tuber at least one inch below the surface of the soil and use the tubers only as breeders. As soon as they send up growths with leaves about 4 or 5 inches in diameter we may then be sure that they have considerable root systems. Then, with the forefinger, get hold of the parent tuber and remove it without damaging the roots of the new plant or plants, because fair sized tubers give as many as four shoots at a time. In a short time the first growths will develop other tubers and the original tubers will again send out shoots. It will be seen that when we have a dozen or more tubers to start with we should be able to raise quite a large number in the course of a year. The point is, never to have the tubers lying idle, and always sell the

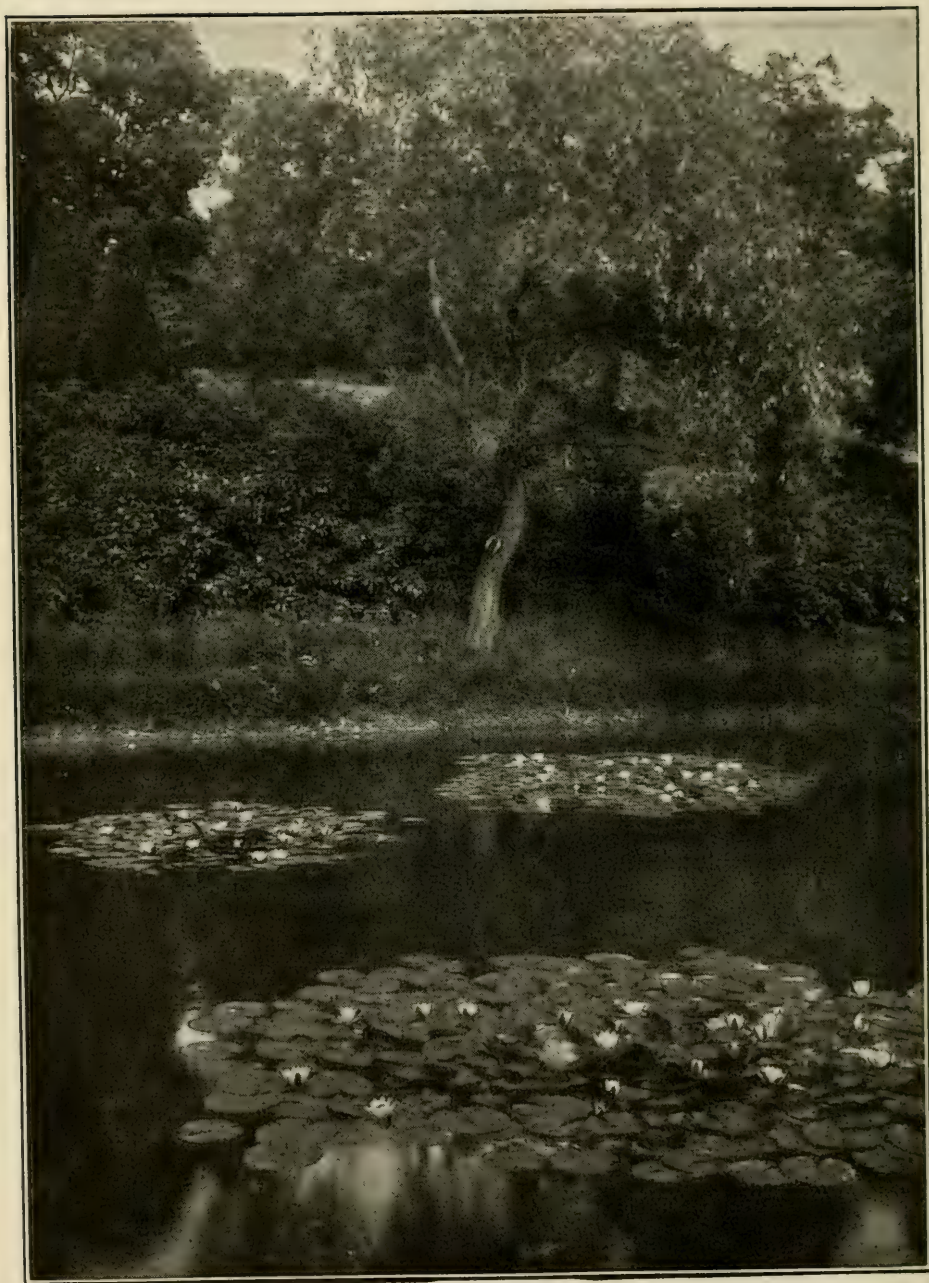
plants instead of the tubers. I have raised 32 tubers within a year, starting only with a single tuber. *N. gigantea* is the aristocrat among the Nymphæas; her ways are not the ways of the common herd, but she responds heartily to the will of the propagator when she is understood. With *N. alba rosea* the trouble seems to be caused by our hot Summers. However, there are numerous other species and many hybrid forms which require much less attention than the majority of other classes of plants to bring them to perfection. Of these about half are tender; the others will stand the Winters successfully if the crowns are low enough in the water to be out of the reach of frost. Or if they be grown in places from which the water has to be drawn in Winter, the plants may be covered with some protecting material. But the question of just how much cold the various kinds will stand has not been ascertained.

The tender kinds are divided into two well defined sections—day blooming and night blooming. In the day blooming section we have *N. (flavo-virens) gracilis*, white; *N. capensis*, *N. stellata*, with numerous forms ranging from colors almost blue to deep rose; *N. ampla (pulcherrima)* produces flowers exactly similar to those from plants raised from seed of *N. (flavo-virens)*, which have evidently been fertilized by pollen from forms of *N. stellata*; *N. elegans*, a Mexican species, has purplish flowers; *N. gigantea*, a light blue-flowered species from Australia, has the largest blooms of all, sometimes attaining a diameter of 16 inches.

The night blooming section is represented by *N. Lotus*, *N. rubra*, *N. rubra (devoniensis)*, *N. dentata* and *N. rubra Sturtevantii*. Most of the other sorts are cross-bred forms between *N. Lotus* and *N. rubra*. All of the tender kinds have thick, swollen root stocks, while the hardy species, with one or two exceptions, have thick, fleshy rhizomes.

Among the hardy sorts *N. odorata* is the one most commonly grown for its flowers. A form of this is known as the Cape Cod Water Lily; *N. odorata rosea* has bright rose colored flowers; *N. o. sulphurea*, *N. Marliacea chromatella* and *N. tuberosa flavescens* have yellow flowers; *N. Marliacea albida* and *N. alba* are pure white. A hybrid race of which *N. Laydekeri rosea* is the best known, has several named kinds with rather odd colors, but they are less desirable than some of the better known varieties. They are, however, well suited for growing in tubs half filled with soil, and the remaining space with water.

Soil. All of the species and varieties will thrive in loam two parts and one part half-rotted cow manure. Another good me-



NYMPHÆAS

dium is formed by adding a 5-inch potful of bonemeal to a bushel of loam.

Starting Tubers into Growth. The tubers of the tender *Nymphæas* should be started not later than the beginning of April. Each tuber should be put in a 5-inch pot, using pure loam. The tuber may be covered with about an inch of soil and a further layer of half an inch of sand, and put in a tank of water at a temperature of from 65 to 70 degrees. After a few leaves have been made the growth should be separated from the tuber and repotted, as this prevents numerous shoots developing when planted out and secures a strong, single growth. This applies to all of the tender sorts. The tubers may be pushed back in the 5-inch pots, where they will continue sending up fresh shoots; these, or as many as wanted, may be potted in 4-inch pots and allowed to go to rest in them. Tubers thus formed should be kept for stock purposes, instead of old plants.

Summer Quarters. In this latitude it is safe to put out the tenderest kinds after the 10th of May. Each plant, whether grown in sunken tubs, boxes, or planted in the bottom of the pond, should have at least three bushels of prepared soil to grow them well. One foot beneath the surface is a safe distance; but they will thrive much deeper.

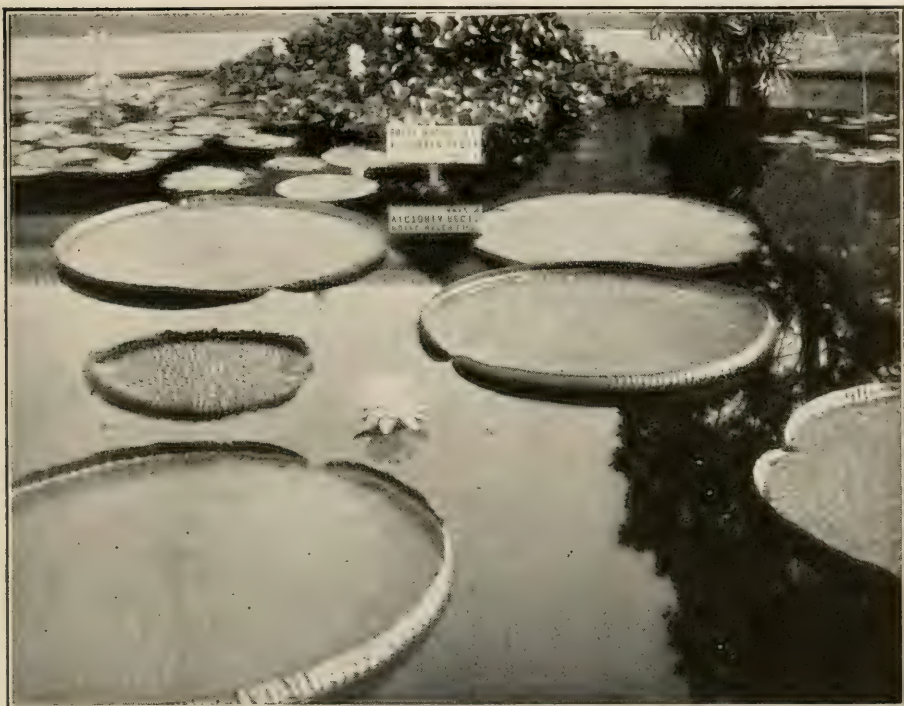
Starting Hardy *Nymphæas*. By the beginning of April any of the hardy *Nymphæas*, which it is necessary to increase or replant, should get attention before they make too much headway. In dividing up such kinds as *N. helvola* and the pink varieties of *N. odorata* with small rhizomes, such as *N. odorata rosea* and *N. exquisita*, or the small pieces of *N. Marliacea chromatella*, it is safest to start the pieces in pots so that they will make a few leaves before being transferred to their permanent quarters. Such kinds as *N. alba*, *N. a. candidissima*, *N. Marliacea albida*, *N. M. rosea*, and *N. M. carnea* have very large rhizomes, and there is little danger but that they will give a good account of themselves after being divided and planted out.

Wintering Tender Water Lilies. From the 15th to the end of October the tender Water Lilies should be taken indoors for the Winter. Where there are small plants or tubers of the tender day blooming species and varieties, such as *N. zanzibarensis*, its varieties as *azurea* and *rosea*, the Australian *N. gigantea*, *N. cærulea* and *N. capensis*, let the old ones go, as they are difficult to keep over the Winter, except in a large greenhouse tank. Small, dormant tubers

of any of the above can be started in the Spring, and by careful manipulation they will give several plants each, which will afford as much, if not more, satisfaction than would the older plants. Another matter which should be kept in mind concerning the above kinds is that they do not form small tubers at the sides of the large ones made during the growing season. The reverse is the case with such species and forms as *N. dentata*, *N. devoniensis*, *N. rubra*, *N. rubra Sturtevantii*, *N. Omarana*, *N. columbiana*, *N. Deaniana*, *N. delicatissima* and *N. Smithiana*. These are all tender, night blooming kinds and form tubers around the sides of the parent tuber or root stock; they are very irregular in shape, not at all resembling the pear shaped tuber of a young starved plant. After the display of flowers is over for the season, cut off the leaves close to the crown, and with a spade cut off the roots about 6 inches from the crown; lift the clump and put beneath the stage of a warm house. The central part will decay in a short time, and before this actually happens the tubers may be gathered and stored for the Winter. *N. gracilis* and *N. pulcherrima*, white and blue, respectively, will keep easily, if the old root stocks are saved, as they do not decay so easily as the other tender day bloomers.

When it is necessary to keep old plants of the above named day bloomers other than *N. gracilis* and *N. pulcherrima*, lift the smallest of the plants, save as many roots and leaves as possible, pot them and sink in a tank, the water of which does not fall below 50 degrees F. There are several methods of keeping the small tubers of the tender Nymphæas over Winter. Those from the night bloomers should not be removed in a hurry, as the wound made by separating is apt to be slow in healing, and the riper the tubers when the work is done the greater the success. They keep well in damp moss, on the floor of a warm house. If they are starved tubers, that is, of the Pear shaped form, there is little fear of decay setting in, for then there are no wounds to heal as in the case of detached tubers. They may be then kept dry, but warm. Probably the safest plan, and the one which I adopt, is to put each kind in a pot of sand and sink in a warm tank.

Raising Hardy Kinds from Seeds. *N. pygmæa* seeds very freely, in fact, every flower may be depended upon to ripen a capsule; but if there is an overflow to the pond the seeds are very apt to get lost, as they float on the surface after being liberated from the capsule. If gathered before this takes place, and the pulpy material removed from around them, they may be thrown in a part of the pond where they are likely to germinate. *N. caroliniana*, *N. tu-*



VICTORIA REGIA

berosa, *N. odorata* and one or two of its varieties set seeds freely, but as they increase so easily from rhizomes there is little need of raising seedlings. Marliac's hybrids are evidently sterile, although the pollen in those tested is good. Some of these hybrids do not permit of division of the root stocks, and the probable reason why they cannot be propagated in this country is, one of the parents of the hybrids being so difficult to grow here it is unavailable for the purpose of pollination. *N. lutea* and *N. mexicana* seed somewhat sparingly, but both kinds have two methods of resting during Winter, so that raising plants from seed is not necessary. When seed is sown, however, it is best kept dry until wanted for sowing. On first appearance the young seedlings resemble small blades of grass, usually of a dark color; they may be allowed to make a few small leaves before being pricked off. When they make leaves about an inch or more in diameter each seedling should be put into a 3-inch pot and subsequently into a 5-inch pot; after this they make rapid growth and may be planted out where they are to bloom.

Victoria (Royal Water Lily). There are two species commonly cultivated, namely, *V. regia* and *V. Cruziana*, the latter usually known as *V. Trickeri*. *V. regia* has leaves over 6 feet in diameter. The leaf of *V. r.* var. *Randii* is much less in diameter, but more turned up at the margins; that of *V. Trickeri*, in size, is intermediate between the two. The Victorias are grown as annuals, the seeds being sown about the beginning of January, and kept in water at a temperature of at least 80 degrees. The first leaves are grass like, gradually assuming the peltate form. The young plants should be encouraged to make all the growth possible before being put out of doors. In this latitude we plant them out about May 20, and treat them in every respect like tender Nymphæas. Each plant should get at least a couple of cartloads of prepared soil, to have the plants at their best.



CHAPTER XVI

Ornamental Grasses

ANDROPOGON (Lemon Grass). The leaves of *A. Schæn-anthus* when bruised emit a fragrance much resembling that of the Lemon Verbena. It is a tender evergreen. When planted out in Summer the growth is very rapid even in dry soils. As a pot plant it has a well defined ornamental appearance, and stands well in a dwelling house.

Propagation. It is propagated by division at any time of the year. The pieces should be placed in wet sand for a few days previous to potting to encourage new roots to form.

ARUNDO (Giant Reed). The tallest of our herbaceous Grasses (*A. Donax*) grows under favorable conditions to a height of 25 feet and flowers late in Summer. A very ornamental plant for the centers of large beds, or for isolated groups on wide borders or lawns. As it increases very rapidly at the root the rhizome like growth may be divided just as the new shoots make their appearance above the soil; these, when heeled in, may be transplanted at any time. *A. D. variegata* grows only about half the height of the green one—an exceedingly desirable plant for the hardy border. To propagate, take the ripe stems and lay them in damp moss or sand; from each joint one or more buds will start into growth and ultimately take root. These young plants, when of sufficient size, may be detached from the parent stem and put in small pots.

BAMBOO. Several genera of Grasses are known as Bamboos. They grow splendidly in a deep soil, but many of the sorts are not hardy even in Washington, D. C. There are one or two species grown in greenhouses and several hardy ones. *Bambusa arundinacea* will grow 60 feet high in a single season. It is useful for roomy structures where quick effects are wanted. *Phyllostachys aurea* is perfectly hardy in Washington, D. C. The growths will reach a height of 15 feet. *B. striata* is grown indoors in Winter. The plants will thrive a long time with limited root accommodation. *P. (rusci-folia) viridinalis*, *Arundinaria chrysantha*, *P. punctata*, *P. mitis* and



CYPERUS ALTERNIFOLIUS. THE UMBRELLA PLANT

P. Marliacea sometimes stand the Winter in the open border without losing their foliage. The leaves of all the hardy Bamboos have tessellated venation; those of the tender kinds have striated venation. *A. Fortunei variegata* should never be placed where it will crowd other plants, as it spreads rapidly and is difficult to eradicate.

Propagation. Increase is best effected by division. The pieces should be started into growth among sand, in a close cool frame, potting off the rarer kinds when a few new roots have been made.

CORTADERIA (*Gynerium*. Pampas Grass). This is, perhaps, the most beautiful of the Grasses, but it is not very hardy and

should best be protected with boxes or barrels placed over the plants and filled with straw or leaves.

Propagation. There are two common methods of increasing this plant, namely, from seed, the usual method, and division of the clumps, which is a more satisfactory method. Dig up a large clump in the Fall; chop it up into pieces small enough to go easily into 6-inch pots. Use stiff loam and pot firmly, standing the plants under benches; water occasionally until the beginning of February, when the plants should be removed from the pots and divided up into the smallest pieces, saving the new roots as much as possible. Shorten the leaves back to half their length and put in the sand bed for a couple of weeks to start fresh roots; then place in 3- or 4-inch pots, and they will form well-furnished plants in a short time.

CYPERUS. Several species are commonly cultivated. *C. alternifolius*, the Umbrella Plant, is useful either as a house plant or for planting out in Summer. Its propagation is more quickly accomplished by leaves than from seed, in the following manner: Get a piece of zinc, or as many pieces as may be wanted, of a size, say, 2 feet square; turn up the sides 3 inches; beat the sides forming the corners together and bend them to one side so as to hold water, fill with sand and saturate with water. Get some mature growths, cut off the stalk and shorten the leaves; insert in the sand and keep thoroughly wet. In a warm house they will send up numerous rooted growths in a short time, which, as they require it, should be potted and grown on. Young plants such as these can very easily be divided. The variegated form does not propagate as readily by this method; it is apt to come green. Division suits it better.

DACTYLIS (Variegated Orchard Grass). *D. glomerata* var. *variegata* grows in waste places in the Eastern States. The green leaved plants are weedy in growth, very floriferous and are never grown in gardens. The variegated form seldom produces many flowers, and these, when they appear, should be removed. It is one of our best low growing variegated Grasses, much used in some places for bedding.

Propagation. It is readily propagated by division.

ELYMUS (Lyme Grass). *E. glaucus* is a very ornamental species with bluish green leaves finely striated on the upper surfaces. It reaches a height of about 2 feet. The habit is inclined to be spreading. In early Spring the growth is about a foot high when most other ornamental Grasses are just showing.

Propagation. It is propagated by division.



ERIANTHUS RAVENNÆ

ERIANTHUS (Hardy Pampas Grass. Plume Grass).

E. Ravennæ comes next in size to the *Arundo*, frequently growing 10 feet high. The growths are stout, ending with very ornamental flowers, which, if taken in a young state and dried in the sun, are quite as showy as those of the Pampas plumes. It is hardy as far north as New York City.

Propagation. The plants produce seeds freely; they should be sown in Autumn and wintered in a cool house.

EULALIA (Miscanthus). The variegated forms of *E. sinensis* (*japonica*) are more frequently used than any other ornamental Grasses. As isolated specimens they grow into very symmetrical subjects, the outer leaves of the clump drooping and almost reaching the ground. There are three kinds usually cultivated—*Eulalia s. foliis-striatus*, *E. s. zebrina* and *E. univittata*. The last named is much more dwarf than the others, the leaves narrow with a whitish stripe down the middle. They are natives of Japan.

Propagation. The crowns should be divided just as the plants are starting into growth. Old clumps will have to be broken up with the aid of a mattock or axe. They may be divided into pieces small enough to go in a 3-inch pot and plunged in a frame among ashes, or they may be heeled among sand in a frame for a couple of weeks or more before potting. They should in any case be kept close for a few days after being divided, in order to start fresh roots.

FESTUCA (Fescue Grass). *F. glauca* grows only a few inches high; the foliage is of a bluish green color.

Propagation. It may be divided and replanted during March or April.

PANICUM (Oplismenus). The correct name is *Oplismenus Burmanni* var. *variegatus*, although the common species is known as *P. variegatum* by florists. A useful little warm house plant, having leaves striped with white and pink. It will grow in shade or sun, and is used chiefly for hanging over the sides of baskets, vases and boxes.

Propagation. The plant is propagated from cuttings in March.

PAPYRUS (Egyptian Paper Plant). *P. antiquorum* is cultivated in conservatories or planted out in the Summer near aquatic gardens. The proper name for this plant is *Cyperus Papyrus*. The Papyrus, after being lifted from its Summer quarters, where the growths made are usually very strong, frequently gets into a half



PAPYRUS ANTIQUORUM. EGYPTIAN PAPER PLANT

sickly state during the Winter months, from which it takes it some time to recuperate after being replanted outside. In Winter the growths are grassy and spindling.

Propagation. If the old plants are taken in hand some time in January, and split up into the smallest pieces and put in the sand bed of a warm house, they will in a few days push out fine, healthy roots and when potted in a mixture of equal parts of moss, sand and manure, will grow very vigorously and will be in splendid trim for the planting out season. If it is desired to increase the stock the young plants, after being in the pots for a few weeks, can be redivided and the operation of rooting gone through as at first. In the absence of a propagating bench a box of sand placed on the hot water pipes answers the same purpose.

PENNISETUM (Fountain Grass). *P. longistylum (villosum)* and *P. Ruppelii* are perhaps the finest of our dwarf Grasses, which are grown principally on account of the very ornamental character of the flowers. They are usually treated as half-hardy annuals, owing to their liability to get winter killed. They sometimes survive the Winters in the District of Columbia, but should always be treated as tender subjects.

Propagation. Plants raised annually from seeds are satisfactory, if sown early; but old plants, divided up will give larger pieces, start into bloom earlier and do not take so much attention as seedlings. The old plants are wintered anywhere out of the reach of frost. About the beginning of February cut off the old leaves to within 6 inches of the crowns; divide into small pieces, trim the roots so that they will ultimately go into 3- or 4-inch pots; place the pieces thickly together in boxes of sandy soil and keep in greenhouse. Pot as soon as the new roots have started. They may be removed to a cool frame long before the soft bedding material demands all the indoor space. There are several other annual and perennial species grown; none, however, is as desirable as the above.

SACCHARUM (Sugar Cane). *S. officinarum violaceum* is a variety of the Sugar Cane with violet or plum colored leaves and stems; useful for sub-tropical bedding.

Propagation. It is easily increased by cutting the stems into pieces, with two joints to each piece, and placing them on the sand bed of a warm house at almost any time. Numerous shoots are produced at the joints, and they make plants rapidly.

STIPA (Feather Grass). *S. pennata* is an old favorite in gardens. The leaves are long and narrow. The flowers are arranged in long, arching spikes, presenting a very delicate appearance. Where this plant is not hardy, a barrow load of forest leaves may be placed over the plant and kept in place with a few Pine branches.

Propagation. Divided in Spring and from seed.

UNIOLA (Spike Grass). *U. latifolia* is a native species which makes an attractive border plant, growing usually from 2 to 3 feet high. The leaves are broad and arching, about an inch wide; the spikelets are drooping on long pedicels. This Grass starts early into growth.

Propagation. One of easiest to propagate by division.

ZIZANIA (Wild Rice). *Z. palustris* (*aquatica*) is an annual species and can be depended upon to make a fine showing near the margins of Lily ponds, but the flower heads should be cut off before the seed ripens, otherwise we will have more plants than we want and it is apt to become a weed. The species known as *Zizania latifolia* is a perennial plant and is not apt to become a weed, because it is seldom seen in flower. When planted near the edge of the pond it can be kept under control. Our native species behaves as an annual. *Z. latifolia* increases very fast from underground rhizomes, and is, if anything, the most ornamental of the two. It is a very popular food for wild game and fish.



Growing Temperatures Required by Plants in Greenhouses

	Deg.		Deg.		Deg.
Abutilon.....	55-65	Chrysanthemums.....	50-52	Metrosideros robusta.....	45
Acacia.....45-50; prop.....	60-70	Cineraria.....	40-45	Mignonette, night.....45-48,	
Acalypha.....70, prop.....	60-70	Clivia.....	at least 40	day.....	55
Achimenes.....	60	Citrus.....	50-55	Monstera, night.....65; day.....	80
Adiantum.....	60	Clerodendron.....	65	Musa, night.....68; day.....	78-88
Farleyense.....	65-70	Cobæa.....	60	Narcissus.....	cool
Agapanthus.....	50	Coleus.....65, prop.....	60-65	Nepenthes.....	80-90
Agathea.....	55	Cordylines.....	55-60	Nymphæa.....	70
Agave.....	70	Cotyledon.....	55-60		
Ageratum.....	50	Crinum.....	70	Orchids	
Aglaonema.....	65-70	Croton, night, not below		Calanthe.....	65-90
Akebia.....	45-50	60; day.....	70	Cattleyas.....	55-60
Allamandas.....	65-70	Cycas.....	50	Cælogyne cristata.....	60
Alocasia, never below.....	60	Cyclamen, night 50; day.....	65	Cypripedium.....	50-55
Aloysia citriodora.....	55	Cytisus.....55, prop.....	45	Dendrobium nobile.....	60
Alternanthera.....	60	Davallia.....	60-65	Lælia anceps.....	50
Alyssum.....	50	Dicksonia.....	55-60	Odontoglossum.....	55-60
Amaryllis, start at 50, run		Dieffenbachias.....	65	Oncidium varicosum,	
to.....	60-70	Dracæna.....	55-60	night 70; day.....	90
Ananas.....	70	fragrans.....	65-70	Phalænopsis.....	70
Anthericum.....	55	Eichhornea.....	60-70	Osmanthus, night.....45-50;	
Anthurium.....	65	Erica, night.....50; day.....	60	day.....	50-55
Antirrhinum, night 48-52, day 70		Eucharis.....	60-65	Oxalis.....	60
Aralia.....	50-60	Euphorbia pulcherrima,		Palms, minimum.....	60
Araucarias.....	50	night.....50-65; day.....	70	Pandanus.....	65-70
Ardisia.....	50	Ficus.....	60-75	Pansies, night.....45; day.....	60
Aristolochia.....	70	Fittonia.....	65 prop.	Pelargonium, prop.....	56-60
Asparagus.....	55-60	Freesias.....	55-60	Peperomias.....55-60, prop.....	75
Aspidistra.....	50-75	Fuchsia.....	prop. 50-55	Petunias.....	45-50
Asplenium.....	55-60	Gardenias, night.....65-68;		Phormium.....	65
Asters.....	55	day.....	65-70	Platynerium, night.....	60
Asilbe.....	55-60	Gerbera.....	bottom heat	Primula:	
Aucuba, cool, prop.....	50-60	Gladiolus.....	50-52	obconica.....	40-45
Azalea.....	45-50	Gloxinias.....	65-70	sinensis.....	50-55
Begonia, night 55-60; day.....	60	Grevillea.....	50	Pteris.....	65
Rex, semi-tuber.....	70	Hedera helix, prop.....	50-55	Rhododendron.....	45-50
Bellis perennis.....	cool	Heliotrope, prop.....	60	Ricinus, Castor Bean.....	70
Bilbergia.....	65-70	Hoya carnosa.....	50	Rose.....	58-60
Bougainvillea.....50-60, re-		Hydrangeas, start.....45,		Saintpaulia.....	65
duce after flowering.		flower.....65, prop.....	50-55	Santolina.....	50-55
Bouvardia.....	60	Impatiens Sultani.....	55	Schizanthus.....	45-50
Brunfelsia.....	50	Iresine.....	60-65	Senecio.....	60
Cactus, night min.....	55	Jasminum.....	50-55	Solanum.....	50-55
Caladium.....	75	Kalmia.....	50	Smilax.....	65
Calathea.....	65 up	Lachenalias.....	50	Stevias, night 40; day 50;	
Calceolaria.....50, never over.....	65	Lantana.....	60-65	prop.....	50-55
Calla.....	55	Lapageria.....	45	Strelitzia.....	50
Camellia, not less than.....	40-60	Lilium, night.....50; day.....	60-70	Swainsona.....	50-55
Cannas.....	40-50	Lily of the Valley.....	70-80	Sweet Peas.....	55-60
Carludovica.....	70-75	Limncharis Humboldtii.....	65	Tradescantia.....	40-45
Carnations.....	50-52	Lomaria.....	65-70	Tuberose.....	50
Centaurea.....	cool 45	Lupinus, night, min.....	45	Verbenas.....	50-55
Cheiranthus.....	45-50	Manettia bicolor.....	60	Victoria.....	70
Chorizema.....58-60, prop.....	65-70	Maranta.....	65	Vinca.....	60-65
				Viola.....	40-60, keep low

Botanical Names of Ornamental Plants

COMMON

The following is a list of the common names of the ornamental plants included in this volume:

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
Aaron's Beard	<i>Saxifraga sarmentosa</i>	Blood Root	<i>Sanguinaria</i>
Achyranthes	<i>Iresine</i>	Blue Bell	<i>Campanula</i>
Adam's Needle	<i>Yucca</i>	Blue Daisy	<i>Felicia</i>
Adder's Tongue	<i>Erythronium</i>	Blue Flag	<i>Iris versicolor</i>
African Blue Lily	<i>Agapanthus</i>	Blue Spirea	<i>Caryopteris</i>
African Daisy	<i>Arctotis</i>	Boston Fern	<i>Nephrolepis</i>
African Golden Daisy	<i>Dimorphotheca</i>	Boston Ivy	<i>Ampelopsis</i>
African Marigold	<i>Tagetes erecta</i>	Bottle Brush	<i>Callistemon</i>
Alabama Snow Wreath	<i>Neviusia</i>	Bouncing Bet	<i>Saponaria officinalis</i>
Almond	<i>Prunus</i>	Bowstring Hemp	<i>Sansevieria</i>
Alum Root	<i>Heuchera</i>	Boxwood	<i>Buxus</i>
Amaranth	<i>Amaranthus</i>	Bread Fruit	<i>Artocarpus</i>
Amazon Lily	<i>Eucharis</i>	Broom	<i>Cytisus</i>
American Cowslip	<i>Dodecatheon</i>	Buck Bean	<i>Menyanthes</i>
American Laurel	<i>Kalmia</i>	Buffalo Berry	<i>Shepherdia</i>
Amethyst	<i>Browallia</i>	Bugle Weed	<i>Ajuga</i>
Angelica Tree	<i>Aralia</i>	Burning Bush	<i>Euonymus atropurpurea</i>
Arrow Wood	<i>Viburnum dentatum</i>	Bush Clover	<i>Lespedeza</i>
Australian Violet	<i>Viola hederacea</i>	Butterfly Bush	<i>Buddleia</i>
Baby's Breath	<i>Gypsophila</i>	Butterfly Flower	<i>Schizanthus</i>
Bachelor's Button	<i>Centaurea</i>	Butterfly Pea	<i>Clitoria</i>
Balloon Vine	<i>Cardiospermum</i>	Butterfly Vine	<i>Stigmaphyllon</i>
Balsam	<i>Impatiens</i>	Butterfly Weed	<i>Asclepias tuberosa</i>
Bamboo	<i>Bambusa</i>	California Privet	<i>Ligustrum</i>
Banana	<i>Musa</i>	California Poppy	<i>Eschscholtzia</i>
Barberry	<i>Berberis</i>	Calla Lily	<i>Zantedeschia (Richardia)</i>
Bastard Indigo	<i>Amorpha</i>	Candytuft	<i>Iberis</i>
Bay Tree	<i>Laurus nobilis</i>	Cape Cowslip	<i>Lachenalia</i>
Bayonet Plant	<i>Aciphylla, Yucca</i>	Cape Fuchsia	<i>Phygelius</i>
Beach Heliotrope	<i>Abronia umbellata</i>	Cape Jessamine	<i>Gardenia</i>
Bead Plant	<i>Nertera</i>	Cape Marigold	<i>Dimorphotheca</i>
Beard Tongue	<i>Pentstemon</i>	Cape Pond Weed	<i>Aponogeton</i>
Bear's Breech	<i>Acanthus</i>	Cape Primrose	<i>Streptocarpus</i>
Bellflower	<i>Campanula</i>	Cardinal Flower	<i>Lobelia cardinalis</i>
Bindweed	<i>Convolvulus</i>	Carnations	<i>Dianthus Caryophyllus</i>
Bird of Paradise	<i>Strelitzia</i>	Castor Bean	<i>Ricinus</i>
Flower	<i>Asplenium nidus</i>	Catchfly	<i>Silene</i>
Bird's-nest Fern	<i>Aristolochia</i>	Cat-tail	<i>Typha</i>
Birthwort	<i>Lewisia</i>	Celandine	<i>Chelidonium</i>
Bitter Root	<i>Orobanch</i>	Century Plant	<i>Agave</i>
Bitter Vetch	<i>Amorphophallus</i>	Chalk Plant	<i>Gypsophila</i>
Black Calla	<i>Thunbergia alata, Rudbeckia</i>	Chaste Tree	<i>Vitex</i>
Black-eyed Susan	<i>Staphylea</i>	Cheddar Pink	<i>Dianthus cæsius</i>
Bladder Nut	<i>Gaillardia</i>	Cherry	<i>Prunus</i>
Blanket Flower	<i>Tritonia</i>	Cherry Laurel	<i>Prunus</i>
Blazing Star	<i>Dicentra spectabilis</i>	Chilean Crocus	<i>Tecophilæa</i>
Bleeding Heart		China Aster	<i>Callistephus hortensis</i>

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
Chinese Bell Flower . . .	<i>Platycodon</i>	Evening Primrose . . .	<i>Oenothera</i>
Chinese Fan Palm . . .	<i>Livistona</i>	Everlasting . . .	<i>Helichrysum</i>
Chinese Lantern Plant . .	<i>Bryophyllum</i>	Fairy Lily . . .	<i>Zephyranthes</i>
	<i>Physalis</i>	Fairy Primrose . .	<i>Primula malacoides</i>
Chinese Pink . . .	<i>Dianthus chinensis</i>	False Acacia . . .	<i>Robinia</i>
Chinese Sacred Lily . . .	<i>Narcissus</i>	False Indigo . . .	<i>Baptisia</i>
Chinese Wisteria . . .	<i>Wistaria sinensis</i>	False Mitrewort . .	<i>Tiarella</i>
Christmas Cactus . . .	<i>Epiphyllum</i>	Feather Grass . . .	<i>Stipa</i>
Christmas Rose . . .	<i>Helleborus</i>	Fescue Grass . . .	<i>Festuca</i>
Cinnamon Fern . . .	<i>Osmunda cinnamo-</i> <i>mea</i>	Fig . . .	<i>Ficus Carica</i>
Climbing Fern . . .	<i>Lygodium</i>	Fig Marigold . .	<i>Mesembryanthemum</i>
Climbing Fumitory . . .	<i>Adlumia</i>	Firecracker Plant .	<i>Cuphea</i>
Cockscomb . . .	<i>Celosia</i>	Fish Grass . . .	<i>Cabomba</i>
Cockspur Thorn . . .	<i>Cratægus</i>	Flax . . .	<i>Linum</i>
Cocoanut . . .	<i>Cocos nucifera</i>	Floss Flower . . .	<i>Ageratum</i>
Columbine . . .	<i>Aquilegia</i>	Flowering Maple . .	<i>Abutilon</i>
Coneflower . . .	<i>Echinacea, Rudbeckia</i>	Foam Flower . . .	<i>Tiarella cordifolia</i>
Coral Bells . . .	<i>Heuchera</i>	Forget-me-not . . .	<i>Myosotis</i>
Coral Berry . . .	<i>Symphoricarpos</i>	Fountain Grass . . .	<i>Pennisetum</i>
Coral Lily . . .	<i>Lilium tenuifolium</i>	Four O'Clock . . .	<i>Mirabilis</i>
Coral Tree . . .	<i>Erythrina</i>	Foxglove . . .	<i>Digitalis</i>
Cornflower . . .	<i>Centaurea cyanus</i>	Fraxinella . . .	<i>Dictamnus</i>
Cornish Heath . . .	<i>Erica</i>	French Marigold . .	<i>Tagetes patula</i>
Cotton Lavender . . .	<i>Santolina</i>	Fringe Tree . . .	<i>Chionanthus</i>
Cowslip . . .	<i>Primula veris</i>	Furze . . .	<i>Ulex</i>
Crab Apple . . .	<i>Pyrus</i>	Garden Pink . .	<i>Dianthus plumarius</i>
Crape Myrtle . . .	<i>Lagerstræmia</i>	Garland Flower . .	<i>Hedychium</i>
Creeping Jenny . . .	<i>Lysimachia</i>	Gas Plant . . .	<i>Dictamnus</i>
Croton . . .	<i>Codiaeum</i>	Gentian . . .	<i>Gentiana</i>
Crown Imperial . . .	<i>Fritillaria</i>	Geranium . . .	<i>Pelargonium</i>
Cup Flower . . .	<i>Nierembergia</i>	German Catchfly . .	<i>Lychnis viscaria</i>
Daffodil . . .	<i>Narcissus</i>	German Ivy . . .	<i>Senecio</i>
Dasheen . . .	<i>Colocasia</i>	Giant Fennel . . .	<i>Ferula</i>
Date Palm . . .	<i>Phoenix</i>	Giant Reed . . .	<i>Arundo</i>
Day Lily . . .	<i>Hemerocallis, Funkia</i>	Giant Spider Plant .	<i>Cleome</i>
Devil's Fig . . .	<i>Argemone</i>	Globe Flower . . .	<i>Kerria</i>
Dog-tooth Violet . . .	<i>Erythronium</i>	Glory of the Snow . .	<i>Chionodoxa</i>
Dogwood . . .	<i>Cornus</i>	Glory Pea . . .	<i>Clianthus</i>
Dusty Miller . . .	<i>Centaurea</i>	Goat's Beard . . .	<i>Spiræa</i>
Dutchman's Pipe . .	<i>Aristolochia sipho-</i>	Gold-banded Lily . .	<i>Lilium auratum</i>
Dwarf Horse-Chestnut . .	<i>Æsculus</i>	Golden Bell . . .	<i>Forsythia</i>
Ebony Spleenwort . .	<i>Asplenium platy-</i> <i>neuron</i>	Golden Chain . . .	<i>Laburnum</i>
Edelweiss . . .	<i>Leontopodium</i>	Gold Dust Tree . . .	<i>Aucuba</i>
Egyptian Lotus . . .	<i>Nelumbium, Nym-</i> <i>phæa</i>	Golden Glow . . .	<i>Rudbeckia</i>
Egyptian Paper Plant . .	<i>Papyrus</i>	Gorse . . .	<i>Ulex</i>
	<i>antiquorum</i>	Grape Hyacinth . . .	<i>Muscari</i>
Elephant Ear . . .	<i>Calocasia</i>	Grass Pink . . .	<i>Dianthus plumarius</i>
Elephant Ear . . .	<i>Begonia Feastii</i>	Guinea-hen Flower .	<i>Fritillaria mele-</i> <i>agris</i>
Empress Tree . . .	<i>Paulownia</i>	Gumi . . .	<i>Elæagnus</i>
English Daisy . . .	<i>Bellis</i>	Harebell . . .	<i>Campanula</i>
English Iris . . .	<i>Iris xiphioides</i>	Hartford Fern . .	<i>Lygodium palmatum</i>
English Ivy . . .	<i>Hedera helix</i>	Hawthorn . . .	<i>Cratægus</i>
English Laurel . . .	<i>Prunus Lauro-ce-</i> <i>rasus</i>	Hay-scented Fern . .	<i>Dicksonia</i>
		Heath . . .	<i>Erica</i>
		Heather . . .	<i>Calluna</i>
		Hedge Nettle . . .	<i>Stachys</i>
		Heliotrope . . .	<i>Heliotropium</i>

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
Heron's Bill	<i>Erodium</i>	Little Pickles	<i>Othonna</i>
Holly	<i>Ilex</i>	Loblolly Bay	<i>Gordonia</i>
Hen and Chickens	<i>Cotyledon</i>	Locust	<i>Robinia</i>
	<i>Echeveria</i>	Loose-strife	<i>Lysimachia</i>
Hollyhock	<i>Althæa</i>	Love-in-a-Mist	<i>Nigella</i>
Holly Fern	<i>Cyrtomium</i>	Love-Lies-Bleeding	<i>Amaranthus</i>
Honey Bell	<i>Mahernia</i>		<i>caudatus</i>
Honeysuckle	<i>Lonicera</i>	Lupine	<i>Lupinus</i>
Hop	<i>Humulus</i>	Lyme Grass	<i>Elymus</i>
Hop Tree	<i>Ptelea</i>	Madeira Vine	<i>Boussingaultia</i>
Horse Mint	<i>Monarda</i>	Madonna Lily	<i>Lilium candidum</i>
Houseleek	<i>Sempervivum</i>	Madwort	<i>Alyssum</i>
Hyacinth	<i>Hyacinthus</i>	Maidenhair Fern	<i>Adiantum</i>
Ice Plant	<i>Mesembryanthemum</i>	Maiden Pink	<i>Dianthus deltoides</i>
	<i>crystallinum</i>	Male Fern	<i>Dryopteris</i>
Iceland Poppy	<i>Papaver nudicaule</i>	Maltese Cross	<i>Lychnis chalcedonica</i>
Indian Currant	<i>Symphoricarpos</i>	Marigold	<i>Tagetes</i>
Interrupted Fern	<i>Osmunda Clay-</i>	Marigold (Pot)	<i>Calendula</i>
	<i>toniana</i>	Marsh Marigold	<i>Caltha</i>
Irish Heath	<i>Dabæcia</i>	Marvel of Peru	<i>Mirabilis</i>
Ivy Geranium	<i>Pelargonium pelta-</i>	Meadow Sweet	<i>Spiræa</i>
	<i>tum</i>	Mexican Foxglove	<i>Tetranema</i>
Japan Cedar	<i>Cryptomeria</i>	Mexican Poppy	<i>Argemone mexicana</i>
Japan Quince	<i>Cydonia</i>	Mexican Tulip Poppy	<i>Hunnemannia</i>
Japanese Iris	<i>Iris lævigata</i>	Michælmass Daisy	<i>Aster</i>
Japanese Lily	<i>Lilium speciosum</i>	Mignonette	<i>Reseda</i>
Japanese Maple	<i>Acer</i>	Mock Orange	<i>Philadelphus</i>
Japanese Toad Lily	<i>Tricyrtis</i>	Moneywort	<i>Lysimachia nummularia</i>
Jasmine	<i>Jasminum</i>	Monkey Flower	<i>Mimulus</i>
Jerusalem Cherry	<i>Solanum capsicastrum</i>	Monkey Puzzle Tree	<i>Araucaria imbricata</i>
Jonquil	<i>Narcissus jonquilla</i>	Monkshood	<i>Aconitum</i>
Judas Tree	<i>Cercis</i>	Moonflower	<i>Ipomæa Bona-nox</i>
Juniper	<i>Juniperus</i>	Morning Glory	<i>Ipomæa</i>
Kangaroo Vine	<i>Cissus</i>	Mosquito Plant	<i>Lopezia racemosa</i>
King's Spear	<i>Eremurus</i>	Moss Pink	<i>Phlox subulata</i>
Knitting Bag Plant	<i>Calceolaria</i>	Mountain Bluet	<i>Centaurea montana</i>
Kudzu Vine	<i>Pueraria</i>	Mountain Laurel	<i>Kalmia latifolia</i>
Lady Fern	<i>Asplenium Filix-fœmina</i>	Mountain Rose	<i>Antigonon</i>
Lady Slipper	<i>Impatiens balsamina</i>	Mullein	<i>Verbascum</i>
Lady Slipper Orchid	<i>Cypripedium</i>	Mullein Pink	<i>Agrostemma</i>
Larkspur	<i>Delphinium</i>	Nasturtium	<i>Tropæolum</i>
Lattice-leaf Plant	<i>Aponogeton</i>	New Zealand Bur	<i>Acæna</i>
Lead Plant	<i>Plumbago</i>	New Zealand Flax	<i>Phormium</i>
Lemon Grass	<i>Andropogon</i>	Norfolk Island Pine	<i>Araucaria</i>
Lemon Lily	<i>Hemerocallis flava</i>	Northern Twin Flower	<i>Linnæa</i>
Lemon Thyme	<i>Thymus serpyllum</i>	Oleander	<i>Nerium</i>
	<i>vulgaris</i>	Opium Poppy	<i>Papaver somniferum</i>
Lemon Verbena	<i>Lippia (Aloysia)</i>	Orchard Grass	<i>Dactylis glomerata</i>
	<i>citriodora</i>	Ornamental Tobacco	<i>Nicotiana</i>
Lenten Rose	<i>Helleborus</i>	Ostrich Fern	<i>Struthiopteris</i>
Leopard Plant	<i>Ligularia</i>	Oxlip	<i>Primula elatior</i>
Leopard's Bane	<i>Doronicum</i>	Pampas Grass	<i>Gynerium argenteum</i>
Lilac	<i>Syringa</i>	Paris Daisy	<i>Chrysanthemum frutescens</i>
Lily	<i>Lilium</i>	Parlor Ivy	<i>Senecio</i>
Lily of the Nile	<i>Agapanthus</i>	Parrot's Bill	<i>Clianthus</i>
Lily of the Valley	<i>Convallaria</i>	Parrot's Feather	<i>Myriophyllum</i>

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
Passion Flower	<i>Passiflora</i>	Royal Water Lily	<i>Victoria</i>
Peach	<i>Prunus</i>	Rubber Plant	<i>Ficus elastica</i>
Pearl Bush	<i>Exochorda</i>		
Peony	<i>Pæonia</i>	Sago Palm	<i>Cycas</i>
Perennial Pea	<i>Lathyrus</i>	Sand Verbena	<i>Abronia umbellata</i>
Periwinkle	<i>Vinca</i>	Saxifrage	<i>Saxifraga</i>
Persian Buttercup	<i>Ranunculus</i>	Scarborough Lily	<i>Vallota</i>
Pincushion Flower	<i>Scabiosa</i>	Scarlet Bush	<i>Hamelia</i>
Pineapple	<i>Ananas</i>	Screw Pine	<i>Pandanus</i>
Pink	<i>Dianthus</i>	Sea Lavender	<i>Statice</i>
Pink-Root	<i>Spigelia</i>	Sea Pink	<i>Armeria</i>
Pinxter Flower	<i>Azalea nudiflora</i>	Sensitive Fern	<i>Onoclea</i>
Pitcher Plant	<i>Nepenthes, Sarracenia</i>	Shield Fern	<i>Aspidium spinulosa</i>
Plantain Lily	<i>Funkia</i>	Shirley Poppy	<i>Papaver Rhæas</i>
Pleurisy Root	<i>Asclepias</i>	Shooting Star	<i>Dodecatheon</i>
Plum	<i>Prunus</i>	Shrubby Althæa	<i>Hibiscus syriacus</i>
Plume Grass	<i>Erianthus</i>	Shrubby Cinquefoil	<i>Potentilla</i>
Plume Poppy	<i>Bocconia</i>	Shrubby Peony	<i>Pæonia moutan</i>
Poison Dogwood	<i>Rhus vernix</i>	Siberian Iris	<i>Iris sibirica</i>
Poison Elder	<i>Rhus vernix</i>	Siberian Squill	<i>Scilla sibirica</i>
Poison Ivy	<i>Rhus Toxicodendron</i>	Silk Oak	<i>Grevillea</i>
Poison Oak	<i>Rhus Toxicodendron</i>	Skull Cap	<i>Scutellaria</i>
Poison Sumach	<i>Rhus vernix</i>	Skunk Lily	<i>Fritillaria imperialis</i>
Polypody	<i>Polypodium</i>	Smilax	<i>Asparagus asparagoides</i>
Pomegranate	<i>Punica</i>	Smoke Tree	<i>Rhus Cotinus</i>
Pond Lily	<i>Nymphæa</i>	Snapdragon	<i>Antirrhinum</i>
Poor Man's Orchid	<i>Schizanthus</i>	Snowball	<i>Viburnum</i>
Poppy	<i>Papaver</i>	Snowberry	<i>Symphoricarpos</i>
Pot Marigold	<i>Calendula</i>	Snow Bush	<i>Phyllanthus</i>
Prayer Plant	<i>Abrus</i>	Snowdrop	<i>Galanthus</i>
Primrose	<i>Primula</i>	Snowdrop Tree	<i>Halesia</i>
Prince's Feather	<i>Amaranthus hypochondriacus</i>	Snowflake	<i>Leucojum</i>
		Snow-in-Summer	<i>Cerastium tomentosum</i>
Privet	<i>Ligustrum</i>		
Purple Coneflower	<i>Echinacea</i>	Soapwort	<i>Saponaria</i>
Purple Loosestrife	<i>Lythrum</i>	Spanish Iris	<i>Iris xiphium</i>
Purple Wreath	<i>Petrea</i>	Spiderwort	<i>Tradescantia</i>
		Speedwell	<i>Veronica</i>
Queen of the Meadow	<i>Spiræa Ulmaria</i>	Spike Grass	<i>Uniola</i>
		Spindle Tree	<i>Euonymus</i>
Rabbit's Foot Fern	<i>Davallia</i>	Squill	<i>Scilla</i>
Ragoon Creeper	<i>Quisqualis</i>	Stag-Horn Fern	<i>Platyserium</i>
Rattlesnake Plantain	<i>Goodyera</i>	Star Jasmine	<i>Trachelospermum</i>
Red Bud	<i>Cercis</i>	St. Bernard's Lily	<i>Anthericum</i>
Red Elder	<i>Sambucus racemosa</i>	St. John's Wort	<i>Hypericum</i>
Red-hot Poker	<i>Kniphofia</i>	Stokes' Aster	<i>Stokesia</i>
Restharrow	<i>Ononis</i>	Stocks	<i>Matthiola</i>
Resurrection Plant	<i>Selaginella lepidophylla</i>	Stonecrop	<i>Sedum</i>
		Storax	<i>Styrax</i>
Rhodora	<i>Azalea canadense</i>	Strawberry Bush	<i>Euonymus americana</i>
Rice Paper Plant	<i>Fatsia</i>	Sugar Cane	<i>Saccharum</i>
Rock Cress	<i>Arabis</i>	Sumach	<i>Rhus</i>
Rock Rose	<i>Cistus, Portulaca</i>	Summer Cypress	<i>Kochia</i>
Rock Strawberry	<i>Duchesnea (Fragaria)</i>	Summer Hyacinth	<i>Galtonia</i>
Rose	<i>Rosa</i>	Summer Lilac	<i>Buddleia</i>
Rose Acacia	<i>Robinia</i>	Summer Snowflake	<i>Leucojum</i>
Rose Mallow	<i>Hibiscus</i>	Sundew	<i>Drosera</i>
Rose of Sharon	<i>Hibiscus syriacus</i>	Sunflower	<i>Helianthus</i>
Rosette Mullein	<i>Ramondia</i>		

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
Swamp Honeysuckle . . .	<i>Azalea viscosum</i>	Umbrella Plant	<i>Cyperus alternifolius</i>
Swan River Daisy . . .	<i>Brachycome</i>	Variegated Laurel . . .	<i>Codiaeum</i>
Sweet Alyssum . . .	<i>Alyssum</i>	Varnish Tree. . .	<i>Kalreuteria</i>
Sweet Flag . . .	<i>Acorus</i>	Venus' Fly Trap . . .	<i>Dionæa</i>
Sweet Pea . . .	<i>Lathyrus odoratus</i>	Violet . . .	<i>Viola</i>
Sweet-scented Shrub . . .	<i>Calycanthus</i>	Virginian Cowslip . . .	<i>Mertensia</i>
Sweet Sultan. . .	<i>Centaurea moschata</i>	Virginian Willow . . .	<i>Itea</i>
Sweet William . . .	<i>Dianthus barbatus</i>	Wake Robin . . .	<i>Trillium</i>
Sweet Woodruff . . .	<i>Asperula</i>	Walking Fern . . .	<i>Camptosorus</i>
Sword Lily . . .	<i>Gladiolus</i>	Wallflower . . .	<i>Cheiranthus</i>
Syringa . . .	<i>Philadelphus</i>	Water Hyacinth. . .	<i>Eichhornia</i>
Tamarisk. . .	<i>Tamarix</i>	Water Lily . . .	<i>Nymphæa</i>
Tango Plant . . .	<i>Chorizema</i>	Water Poppy . . .	<i>Limncharis</i>
Tansy. . .	<i>Tanacetum</i>	Wax Plant . . .	<i>Hoya</i>
Thunbergian Lily . . .	<i>Lilium elegans</i>	Weigelia . . .	<i>Diervilla</i>
Thyme . . .	<i>Thymus</i>	Whin . . .	<i>Ulex</i>
Tick Trefoil . . .	<i>Desmodium</i>	White Irish Heath . . .	<i>Dabæcia</i>
Tiger Flower. . .	<i>Tigridia</i>	White Kerria . . .	<i>Rhodotypos</i>
Tiger Lily . . .	<i>Lilium tigrinum</i>	Whorl Flower . . .	<i>Morina</i>
Torch Lily . . .	<i>Tritoma</i>	Wild Rice . . .	<i>Zizania</i>
Transvaal Daisy. . .	<i>Gerbera</i>	Willow . . .	<i>Salix</i>
Treasure Vine . . .	<i>Hidalgoa</i>	Windflower . . .	<i>Anemone</i>
Tree Violet . . .	<i>Tinnea</i>	Winter Aconite . . .	<i>Eranthis</i>
Trumpet Vine . . .	<i>Campsis (Tecoma)</i>	Wishbone Flower . . .	<i>Torenia</i>
Tuberose . . .	<i>Polianthes</i>	Witches' Thimbles. . .	<i>Digitalis</i>
Tufted Pansies . . .	<i>Viola cornuta</i>	Wood Hyacinth . . .	<i>Scilla</i>
Tulip . . .	<i>Tulipa</i>	Youth and Old Age . . .	<i>Zinnia</i>
Turban Buttercup . . .	<i>Ranunculus</i>	Zanzibar Balsam	<i>Impatiens Sultani</i>
Turk's Cap Lily. . .	<i>Lilium superbum</i>		



Common Names of Ornamental Plants

BOTANICAL

BOTANICAL NAME	COMMON NAME	BOTANICAL NAME	COMMON NAME
<i>Abronia umbellata</i>	Beach Heliotrope	<i>Aspidium spinulosum</i>	Shield Fern
	Sand Verbena	<i>Asplenium Filix-fœmina</i>	Lady Fern
<i>Abrus</i>	Prayer Plant	<i>Asplenium nidus</i>	Bird's-nest Fern
<i>Abutilon</i>	Flowering Maple	<i>Asplenium platyneuron</i>	Ebony
<i>Acæna</i>	New Zealand Bur		Spleenwort
<i>Acanthus</i>	Bear's Breech	<i>Aster</i>	Michaelmas Daisy
<i>Acer</i>	Japanese Maple	<i>Aucuba</i>	Gold Dust Tree
<i>Aciphylla</i>	Bayonet Plant	<i>Azalea canadense</i>	Rhodora
<i>Aconitum</i>	Monkshood	<i>Azalea nudiflora</i>	Pinxter Flower
<i>Acorus</i>	Sweet Flag	<i>Azalea viscosum</i>	Swamp Honeysuckle
<i>Adiantum</i>	Maidenhair Fern	<i>Bambusa</i>	Bamboo
<i>Adumia</i>	Climbing Fumitory	<i>Baptisia</i>	False Indigo
<i>Æsculus</i>	Dwarf Horse-Chesnut	<i>Bellis</i>	English Daisy
<i>Agapanthus</i>	African Blue Lily	<i>Berberis</i>	Barberry
	Lily of the Nile	<i>Browallia</i>	Amethyst
<i>Agave</i>	Century Plant	<i>Bryophyllum</i>	Chinese Lantern Plant
<i>Ageratum</i>	Floss Flower	<i>Bocconia</i>	Plume Poppy
<i>Ajuga</i>	Bugle Weed	<i>Boussingaultia</i>	Madeira Vine
<i>Althæa</i>	Hollyhock	<i>Brachycome</i>	Swan River Daisy
<i>Alyssum</i>	Madwort, Sweet Alyssum	<i>Buddleia</i>	Butterfly Bush
<i>Amaranthus</i>	Amaranth	<i>Buddleia</i>	Summer Lilac
<i>Amaranthus caudatus</i>	Love-Lies-Bleeding	<i>Buxus</i>	Boxwood
<i>Amaranthus hypochondriacus</i>	Prince's Feather	<i>Cabomba</i>	Fish Grass
<i>Amorpha</i>	Bastard Indigo	<i>Calceolaria</i>	Knitting Bag Plant
<i>Amorphophallus</i>	Black Calla	<i>Calendula</i>	Marigold (Pot)
<i>Ampelopsis</i>	Boston Ivy	<i>Callistemon</i>	Bottle Brush
<i>Ananas</i>	Pineapple	<i>Callistephus hortensis</i>	China Aster
<i>Anemone</i>	Windflower	<i>Calluna</i>	Heather
<i>Andropogon</i>	Lemon Grass	<i>Caltha</i>	Marsh Marigold
<i>Anthericum</i>	St. Bernard's Lily	<i>Calycanthus</i>	Sweet-scented Shrub
<i>Antigonon</i>	Mountain Rose	<i>Campanula</i>	Bellflower, Harebell
<i>Antirrhinum</i>	Snappedragon		Blue Bell
<i>Aponogelon</i>	Cape Pond Weed, Lat-tice-leaf Plant	<i>Camptosorus</i>	Walking Fern
<i>Aquilegia</i>	Columbine	<i>Cardiospermum</i>	Balloon Vine
<i>Arabis</i>	Rock Cress	<i>Caryopteris</i>	Blue Spirea
<i>Aralia</i>	Angelica Tree	<i>Celosia</i>	Cockscomb
<i>Araucaria excelsa</i>	Norfolk Island Pine	<i>Centaurea</i>	Bachelor's Button, Dusty Miller, Mountain Bluet
<i>Araucaria imbricata</i>	Monkey Puzzle Tree	<i>Centaurea cyanus</i>	Cornflower
<i>Arctotis</i>	African Daisy	<i>Centaurea moschata</i>	Sweet Sultan
<i>Argemone</i>	Devil's Fig	<i>Cerastium</i>	Snow-in-Summer
<i>Argemone mexicana</i>	Mexican Poppy	<i>Cercis</i>	Judas Tree, Red Bud
<i>Aristolochia</i>	Birthwort	<i>Cheiranthus</i>	Wallflower
<i>Aristolochia siphon</i>	Dutchman's Pipe	<i>Chelidonium</i>	Celandine
<i>Armeria</i>	Sea Pink	<i>Chionanthus</i>	Fringe Tree
<i>Artocarpus</i>	Bread Fruit	<i>Chionodoxa</i>	Glory of the Snow
<i>Arundinaria</i>	Bamboo	<i>Chorizema</i>	Tango Plant
<i>Arundo</i>	Giant Reed	<i>Chrysanthemum</i>	Paris Daisy, Pyrethrum
<i>Asclepias</i>	Pleurisy Root	<i>Cistus</i>	Rock Rose
<i>Asclepias tuberosa</i>	Butterfly Weed	<i>Cleome</i>	Giant Spider Plant
<i>Asparagus</i>	includes Smilax	<i>Clanthus</i>	Glory Pea, Parrot's Bill
<i>Asperula</i>	Sweet Woodruff	<i>Clitoria</i>	Butterfly Pea
		<i>Cocos</i>	Cocoanut

BOTANICAL NAME	COMMON NAME	BOTANICAL NAME	COMMON NAME
<i>Codiaeum</i>	Croton, Variegated Laurel	<i>Fatsia</i>	Rice Paper Plant
<i>Convallaria</i>	Lily of the Valley	<i>Felicia</i>	Blue Daisy
<i>Convolvulus</i>	Bindweed	<i>Ferula</i>	Giant Fennel
<i>Cornus</i>	Dogwood	<i>Festuca</i>	Fescue Grass
<i>Cotyledon</i>	Hen and Chickens	<i>Ficus Carica</i>	Fig
<i>Crataegus</i>	Hawthorn	<i>Ficus elastica</i>	Rubber Plant
<i>Cryptomeria</i>	Japan Cedar	<i>Forsythia</i>	Golden Bell
<i>Euphea</i>	Firecracker Plant	<i>Fragaria</i>	Rock Strawberry
<i>Cycas</i>	Sago Palm	<i>Fritillaria imperialis</i>	Crown Imperial, Skunk Lily
<i>Cydonia</i>	Japan Quince	<i>Fritillaria meleagris</i>	Guinea-hen Flower
<i>Cyperus alternifolius</i>	Umbrella Plant	<i>Funkia</i>	Plantain Lily, Day Lily
<i>Cypripedium</i>	Lady Slipper Orchid	<i>Gaillardia</i>	Blanket Flower
<i>Cyrtomium</i>	Holly Fern	<i>Galanthus</i>	Snowdrop
<i>Cytisus</i>	Broom, Genista	<i>Galtonia</i>	Summer Hyacinth
<i>Dabæcia</i>	White Irish Heath	<i>Gardenia</i>	Cape Jessamine
<i>Dactylis glomerata</i>	Orchard Grass	<i>Gentiana</i>	Gentian
<i>Davallia</i>	Rabbit's Foot Fern	<i>Gerbera</i>	Transvaal Daisy
<i>Delphinium</i>	Larkspur	<i>Gladolus</i>	Sword Lily
<i>Desmodium</i>	Tick Trefoil	<i>Goodyera</i>	Rattlesnake Plantain
<i>Dianthus</i>	Pink	<i>Gordonia</i>	Loblolly Bay
<i>Dianthus barbatus</i>	Sweet William	<i>Grevillea</i>	Silk Oak
<i>Dianthus Caryophyllus</i>	Carnation	<i>Gynerium argenteum</i>	Pampas Grass
<i>Dicentra spectabilis</i>	Bleeding Heart	<i>Gypsophila</i>	Baby's Breath, Chalk Plant
<i>Dicksonia</i>	Hay-scented Fern	<i>Halesia</i>	Snowdrop Tree
<i>Dictamnus</i>	Gas Plant, Fraxinella	<i>Hamelia</i>	Scarlet Bush
<i>Diervilla</i>	Weigela	<i>Hedera helix</i>	English Ivy
<i>Digitalis</i>	Foxglove, Witches' Thimble	<i>Hedychium</i>	Garland Flower
<i>Dimorphotheca</i>	African Golden Daisy, Cape Marigold	<i>Helianthus</i>	Sunflower
<i>Dionæa</i>	Venus' Fly Trap	<i>Helichrysum</i>	Everlasting
<i>Dodecatheon</i>	American Cowslip, Shooting Star	<i>Heliotropium</i>	Heliotrope
<i>Doronicum</i>	Leopard's Bane	<i>Helleborus</i>	Christmas Rose, Lenten Rose
<i>Drosera</i>	Sundew	<i>Hemerocallis</i>	Day Lily, Lemon Lily
<i>Duchesnea</i>	Rock Strawberry	<i>Heuchera</i>	Alum Root, Coral Bells
<i>Echeveria</i>	Hen and Chickens	<i>Hibiscus</i>	Rose Mallow
<i>Echinacea</i>	Purple Coneflower	<i>Hibiscus syriacus</i>	Rose of Sharon, Shubby Althæa
<i>Eichhornia</i>	Water Hyacinth	<i>Hidalgoo</i>	Treasure Vine
<i>Elymus</i>	Lyme Grass	<i>Hoya</i>	Wax Plant
<i>Epiphyllum</i>	Christmas Cactus	<i>Humulus</i>	Hop
<i>Eranthis</i>	Winter Aconite	<i>Hunnemannia</i>	Mexican Tulip Poppy
<i>Eremurus</i>	King's Spear	<i>Hyacinthus</i>	Hyacinth
<i>Erianthus Ravennæ</i>	Plume Grass	<i>Hypericum</i>	St. John's Wort
<i>Erica</i>	Heath	<i>Iberis</i>	Candytuft
<i>Erodium</i>	Heron's Bill	<i>Ilex</i>	Holly
<i>Erythrina</i>	Coral Tree	<i>Impatiens</i>	Balsam
<i>Erythronium</i>	Adder's Tongue, Dog-tooth Violet	<i>Impatiens balsamina</i>	Lady Slipper
<i>Eschscholtzia</i>	California Poppy	<i>Impatiens Sultani</i>	Zanzibar Balsam
<i>Eucharis</i>	Amazon Lily	<i>Ipomæa</i>	Morning Glory
<i>Euonymus</i>	Spindle Tree	<i>Ipomæa Bona-nox</i>	Moonflower
<i>Euonymus atro-purpurea</i>	Burning Bush	<i>Iresine</i>	Achyranthes
<i>Euonymus americana</i>	Strawberry Bush	<i>Iris</i>	Flag
<i>Exochorda</i>	Pearl Bush	<i>Itea</i>	Virginian Willow
		<i>Jasminum</i>	Jasmine

BOTANICAL NAME	COMMON NAME	BOTANICAL NAME	COMMON NAME
<i>Juniperus</i>	Juniper	<i>Nerium</i>	Oleander
<i>Kalmia</i>	American Laurel	<i>Nertera</i>	Bead Plant
<i>Kalmia latifolia</i>	Mountain Laurel	<i>Neviusia</i>	Alabama Snow Wreath
<i>Kerria</i>	Globe Flower	<i>Nicotiana</i>	Ornamental Tobacco
<i>Kniphofia</i>	Red-hot Poker	<i>Nierembergia</i>	Cup Flower
<i>Kochia</i>	Summer Cypress	<i>Nigella</i>	Love-in-a-Mist
<i>Kœlreuteria</i>	Varnish Tree	<i>Nymphœa</i>	Pond Lily
<i>Laburnum</i>	Golden Chain		Water Lily
<i>Lachenalia</i>	Cape Cowslip	<i>Ænothera</i>	Evening Primrose
<i>Lagerstrœmia</i>	Crape Myrtle	<i>Onoclea</i>	Sensitive Fern
<i>Lathyrus</i>	Perennial Pea	<i>Onoclea Struthiopteris</i>	Ostrich Fern
<i>Lathyrus odoratus</i>	Sweet Pea	<i>Ononis</i>	Restharrow
<i>Laurus nobilis</i>	Bay Tree	<i>Orobus</i>	Bitter Vetch
<i>Leontopodium</i>	Edelweiss	<i>Othonna</i>	Little Pickles
<i>Lespedeza</i>	Bush Clover	<i>Osmunda cinnamomea</i>	Cinnamon
<i>Leucojum</i>	Summer Snowflake		Fern
<i>Lewisia</i>	Bitter Root	<i>Osmunda Claytoniana</i>	Interrupted
<i>Ligularia</i>	Leopard Plant		Fern
<i>Ligustrum</i>	Privet	<i>Pœonia</i>	Peony
<i>Lilium</i>	Lily	<i>Pandanus</i>	Screw Pine
<i>Limnœcharis</i>	Water Poppy	<i>Papaver</i>	Poppy
<i>Linnœa</i>	Northern Twin Flower	<i>Papyrus antiquorum</i>	Egyptian
<i>Linum</i>	Flax		Paper Plant
<i>Lippia (Aloysia) citriodora</i>	Lemon	<i>Passiflora</i>	Passion Flower
	Verbena	<i>Paulownia</i>	Empress Tree
<i>Livistona</i>	Chinese Fan Palm	<i>Pelargonium</i>	Geranium
<i>Lobelia</i>	Cardinal Flower	<i>Pennisetum</i>	Fountain Grass
<i>Lonicera</i>	Honeysuckle	<i>Pentstemon</i>	Beard Tongue
<i>Lopezia racemosa</i>	Mosquito Plant	<i>Petrea</i>	Purple Wreath
<i>Lupinus</i>	Lupine	<i>Philadelphus</i>	Mock Orange, Syringa
<i>Lychnis chalcœdonica</i>	Maltese Cross	<i>Phlox subulata</i>	Moss Pink
<i>Lychnis viscaria</i>	German Catchfly	<i>Phœnix</i>	Date Palm
<i>Lygodium</i>	Climbing Fern	<i>Phormium</i>	New Zealand Flax
<i>Lygodium palmatum</i>	Hartford Fern	<i>Phygælius</i>	Cape Fuchsia
<i>Lysimachia</i>	Creeping Jenny	<i>Phyllanthus</i>	Snow Bush
	Loosestrife	<i>Phyllostachys</i>	Bamboo
<i>Lysimachia nummularia</i>	Moneywort	<i>Physalis</i>	Chinese Lantern Plant
<i>Lythrum</i>	Purple Loosestrife	<i>Platycerium</i>	Stag Horn Fern
<i>Mahernia</i>	Honey Bell	<i>Platycodon</i>	Chinese Bell Flower
<i>Matthiola</i>	Stocks	<i>Polianthes</i>	Tuberose
<i>Menyanthes</i>	Buck Bean	<i>Polypodium</i>	Polypody
<i>Mertensia</i>	Virginian Cowslip	<i>Portulaca</i>	Rock Rose
<i>Mesembryanthemum</i>	Fig Marigold	<i>Potentilla</i>	Shrubby Cinquefoil
<i>Mesembryanthemum crystallinum</i>	Ice Plant	<i>Primula</i>	Primrose
		<i>Primula elatior</i>	Oxlip
<i>Mimulus</i>	Monkey Flower	<i>Primula veris</i>	Cowslip
<i>Mirabilis</i>	Four O'Clock, Marvel of Peru	<i>Prunus</i>	Plum, Cherry, Almond, Peach
<i>Monarda</i>	Horse Mint	<i>Ptelea</i>	Hop Tree
<i>Morina</i>	Whorl Flower	<i>Pueraria</i>	Kudzu Vine
<i>Musa</i>	Banana	<i>Punica</i>	Pomegranate
<i>Muscari</i>	Grape Hyacinth	<i>Pyrus</i>	Crab Apple
<i>Myosotis</i>	Forget-me-not		
<i>Myriophyllum</i>	Parrot's Feather	<i>Quisqualis</i>	Ragoon Creeper
<i>Narcissus</i>	Daffodil, Jonquil	<i>Ramondia</i>	Rosette Mullein
<i>Nepenthes</i>	Pitcher Plant	<i>Ranunculus</i>	Persian Buttercup
<i>Nephrolepis</i>	Boston Fern		Turban Buttercup

BOTANICAL NAME	COMMON NAME	BOTANICAL NAME	COMMON NAME
<i>Reseda</i>	Mignonette	<i>Stokesia</i>	Stokes' Aster
<i>Rhus Cotinus</i>	Smoke Tree, Sumach	<i>Strelitzia</i>	Bird of Paradise Flower
<i>Rhus Toxicodendron</i>	Poison Oak	<i>Streptocarpus</i>	Cape Primrose
	Poison Ivy	<i>Styrax</i>	Storax
<i>Rhus vernix</i>	Poison Sumach	<i>Symphoricarpos</i>	Snowberry, Coral Berry, Indian Currant
	Poison Dogwood, Poison Elder		
<i>Richardia</i>	Calla Lily	<i>Syringa</i>	Lilac
<i>Ricinus</i>	Castor Bean	<i>Tagetes</i>	Marigold
<i>Rhodotypos</i>	White Kerria	<i>Tamarix</i>	Tamarisk
<i>Robinia</i>	Rose Acacia, False Acacia	<i>Tanacetum</i>	Tansy
<i>Rosa</i>	Rose	<i>Tecoma</i>	Trumpet Vine
<i>Rudbeckia</i>	Coneflower, Golden Glow	<i>Tecophilæa</i>	Chilean Crocus
<i>Saccharum</i>	Sugar Cane	<i>Tetranema</i>	Mexican Foxglove
<i>Salix</i>	Willow	<i>Thunbergia alata</i>	Black-eyed Susan
<i>Sambucus racemosa</i>	Red Elder	<i>Thymus</i>	Thyme
<i>Sanguinaria</i>	Blood Root	<i>Tiarella</i>	False Mitrewort
<i>Sansevieria</i>	Bowstring Hemp	<i>Tiarella cordifolia</i>	Foam Flower
<i>Santolina</i>	Cotton Lavender	<i>Tigridia</i>	Tiger Flower
<i>Saponaria</i>	Soapwort	<i>Tinnea</i>	Tree Violet
<i>Saponaria officinalis</i>	Bouncing Bet	<i>Torenia</i>	Wishbone Flower
<i>Sarracenia</i>	Pitcher Plant	<i>Trachelospermum</i>	Star Jasmine
<i>Saxifraga</i>	Saxifrage	<i>Tradescantia</i>	Spiderwort
<i>Saxifraga sarmentosa</i>	Aaron's Beard	<i>Tricyrtis</i>	Japanese Toad Lily
<i>Scabiosa</i>	Pincushion Flower	<i>Trillium</i>	Wake Robin
<i>Schizanthus</i>	Butterfly Flower	<i>Tritoma</i>	Torch Lily
	Poor Man's Orchid	<i>Tritonia</i>	Blazing Star
<i>Scilla</i>	Squill, Wood Hyacinth	<i>Tropæolum</i>	Nasturtium
<i>Scutellaria</i>	Skull Cap	<i>Tulipa</i>	Tulip
<i>Sedum</i>	Stonecrop	<i>Typha</i>	Cat-tail
<i>Selaginella lepidophylla</i>		<i>Ulex</i>	Whin, Gorse, Furze
	Resurrection Plant	<i>Uniola</i>	Spike Grass
<i>Sempervivum</i>	Houseleek	<i>Vallota</i>	Scarborough Lily
<i>Senecio</i>	German Ivy, Parlor Ivy	<i>Verbascum</i>	Mullein
<i>Shepherdia</i>	Buffalo Berry	<i>Veronica</i>	Speedwell
<i>Silene</i>	Catchfly	<i>Viburnum</i>	Snowball
<i>Solanum capsicastrum</i>	Jerusalem Cherry	<i>Viburnum dentatum</i>	Arrowwood
		<i>Vinca</i>	Periwinkle
<i>Spigelia</i>	Pink-Root	<i>Viola</i>	Violet
<i>Spiræa</i>	Goat's Beard, Meadow Sweet	<i>Vilex</i>	Chaste Tree
	Bridal Wreath	<i>Wistaria sinensis</i>	Chinese Wisteria
<i>Spiræa ulmaria</i>	Queen of the Meadow	<i>Yucca</i>	Adam's Needle
<i>Stachys</i>	Hedge Nettle	<i>Zantedeschia</i>	Calla Lily
<i>Staphylea</i>	Bladder Nut	<i>Zephyranthes</i>	Fairy Lily
<i>Statice</i>	Sea Lavender	<i>Zinnia</i>	Youth and Old Age
<i>Stigmaphyllon</i>	Butterfly Vine	<i>Zizania</i>	Wild Rice
<i>Stipa</i>	Feather Grass		

Index of Scientific Names

Refer to List on Page 424 for common names

Page	Page	Page
Abelia.....293	Amaryllis.....244	Arundo.....415
Abronia.....165	(See Crinum, 253;	Asclepias
Abrus.....52	Hippeastrum, 263;	<i>Curassavica</i>281
Abutilon.....52, 280	Zephyranthes, 277)	<i>tuberosa</i>175
Acacia.....52	culture in frames..244	Asparagus (Includes
Acæna.....165	pot culture.....246	Smilax).....63
Acalypha.....55, 280	Amorpha.....294	rust.....45
Acanthophœnix..55, 142	Amorphophallus...246	Asperula.....176
Acanthus.....165	Ameplopsis.....363	Aspidium.....383
Acer.....293	Amygdalus	greenhouse sorts (See
Achillea.....166	(See Prunus 329)	Polystichum 399)
Achimenes.....243	Ananas.....56	hardy sorts (See Dry-
Achyranthes	Andropogon.....415	opteris 387)
(See Iresine 285)	Anemone.....170	Aspidistra.....65, 278
Aciphylla.....166	<i>alpina</i>170	Asplenium.....386, 391
Acocanthera.....55	<i>apennina</i>170	hardy.....387
Aconitum.....166	<i>coronaria</i>246	Aster bug.....50
Acorus.....403	<i>fulgens</i>246	Aster, China.....225
Actinidia.....360	<i>hortensis</i>246	Aster (not China)...176
Adamia	<i>japonica</i>170	Astilbe
(See Dichroa 109)	<i>nemorosa</i>170	<i>japonica</i>65, 176
Adenocalymna....360	Anthericum.....57	<i>Lemoinei</i>176
Adiantum..278, 383, 388	Antirrhinum.....172	<i>Thunbergii</i>177
hardy.....387	Anthurium.....57	see also.....216-217
propagation.....390	Antigonon.....363	Attalea.....67, 142
Adlumia.....360	Aponogeton.....403	Aubrietia.....177
Adonis.....168	Aquilegia.....172	Aucuba.....67, 296
Æchynanthus	Arabis.....173	Azalea
(See Trichosporum 160)	Aralia	after flowering....69
Æsculus.....294	greenhouse species 59	culture.....68
Æthionema.....168	hardy shrubs....296	cuttings.....70, 297
Agapanthus.....244	Araucaria.....61	Ghent.....69
Agathæa	Arauja	grafting.....297
(See Felicia 121)	(See Schubertia 379)	hardy species....296
Agave.....55	Aretotis.....224	hydrocyanic acid
Ageratum.....223	Ardisia.....61	gas.....49
Agrostemma.....168	Areca	<i>indica</i>68
Ajuga.....169	(See Chrysolidicarpus	indoor culture....68
Akebia.....360	97, 142)	propagation...70, 297
Allamanda.....361	Arenga.....142	removing buds...69
Alocasia.....56	Argemone.....175	speeding up tem-
Aloe.....56	Aristolochia.....364	perature.....68
Aloysia	Armeria.....175	watering.....69
(See Lippia 134)	Artocarpus.....63	Azolla.....404
Alternanthera....280	Artocarpus	Bamboo.....415
Althæa.....169	(See Spiræa 216)	Bambusa
Alyssum, perennials.169	Arundinaria	(See Bamboo 415)
Sweet.....224	(See Bamboo 415)	Baptisia.....177
Amaranthus.....224		

	Page		Page		Page
Begonia		Callicarpa.....	299	Cattleya.....	89
<i>Evansiana</i>	177	Callirhoë.....	178	plant showing air	
fibrous rooted....	70	Callistemon.....	80	roots and pseudo-	
<i>fuchsoides</i>	282	Callistephus		bulbs.....	140
Gloire de Lorraine		(See China Aster,		Celosia.....	225
group.....	71	p. 225)		Centaurea.....	182
hardy.....	177	Calluna.....	180	Centradenia.....	89
<i>Rex</i>	70	(See Erica 310)		Centropogon.....	89
Rhizomatous....	70	Calycanthus.....	299	Cephalotaxus	
<i>semperflorens</i>	282	<i>præcox</i> (See Chi-		(For propagation,	
sowing seed....	25, 282	monanthus 301)		see Juniperus, 318)	
tuberous rooted..	70	Camellia.....	80	Cerastium.....	182
Winter flowering..	73	Campanula.....	180	Cerasus	
Bellis.....	282	Campsis.....	367	(See Prunus 329)	
Berberis.....	298	Camptosorus.....	387	Cerastostigma	
Bignonia.....	364	Canna		(See Plumbago 211)	
Biota (For propaga-		history.....	250	Cephalis	
tion, see Juniperus		outdoor culture...	251	propagation.....	24
318)		raising from seed..	252	Cercis.....	301
Blackberry		storing.....	251	Cereus	
propagation.....	24	Winter forcing....	80	(See Cactus 76)	
Blechnum.....	392	Cape Jasmine		Ceroxylon.....	143
Bocconia.....	178	(See Gardenia 125)		Cestrum.....	91
Bougainvillea.....	365	Cardiospermum....	367	Chænomeles.....	301
Boussingaultia.....	365	Carica.....	81	Chæncstoma.....	282
Bouvardia.....	73	Caryopteris.....	300	Chamæbatia.....	183
Brachycome.....	224	Caryota.....	143	Chamærops.....	91, 142
Browallia.....	224	Carludovica.....	81	Cheilanthes....	383, 387
(See also Streptosolen		Carnation.....	83	Cheiranthus.....	183
156)		disbudding.....	86	Chelidonium.....	183
Browallia.....	75	evolution.....	83	Chelone	
Brunfelsia.....	75	feeding.....	86	(See Pentstemon 208)	
Bryonia.....	367	hydrocyanic acid		Childsia	
Bryonopsis		gas.....	49	(See Hidaigoa 372)	
(See Bryonia 367)		lifting and plant-		Chimonanthus....	301
Buddleia.....	298	ing.....	84	China Aster.....	225
Butneria		planting in field..	83	Chionanthus.....	301
(See Calycanthus 299)		planting in house..	84	Chionodoxa....	242, 252
Buxus.....	299	propagation.....	87	Chorizema.....	91
Cabomba.....	404	benching.....	87	Chrysanthemum	
Cactus.....	76	cuttings.....	88	<i>frutescens</i>	
soil for.....	13	house.....	87	See Paris Daisies 145)	
Caladium		material for cut-		Chrysanthemum... 92	
culture.....	247	tings.....	88	hydrocyanic acid	
Dasheen or Ele-		sand.....	88	gas.....	49
phant's Ear....	247	treatment of cut-		insects.....	96
fancy leaved.....	247	tings.....	88	late flowering	
Her Majesty, <i>cut.</i>	248	rust.....	50	plants.....	94
preparations for		soil.....	84	propagation.....	97
lifting.....	249	supports.....	86	selecting the bud.	94
propagation....	250	syringing.....	86	soil.....	93
starting tubers....	247	temperature.....	86	specimen plants..	96
storing tubers....	249	to follow Chrysan-		stock plants.....	97
Calanthe.....	77	themums.....	87	varieties.....	93
Calathea.....	77	varieties.....	83	ventilation.....	94
See Maranta.....	135	ventilation.....	87	Chrysalidocarpus...	97
Calceolaria.....	79	Catananche.....	182	Cibotium.....	392
Calendula.....	224				

	Page
Cineraria.....	98
hydro-cyanic acid	
gas.....	49
Cissus.....	367
Cistus.....	301
Citrus.....	303
Clarkia.....	225
Clematis.....	368
Clematis	
<i>Davidiana</i>	184
<i>heracleæfolia</i>	184
<i>recta</i>	184
Cleome.....	225
Clerodendron.....	370
Clerodendron	
greenhouse species	24
hardy.....	303
Clanthus.....	98
Clivia.....	252
Clitoria.....	370
Cobæa.....	371
Cocos.....	100
Codiaeum	
greenhouse.....	100
outdoor use.....	283
Cœtogyne.....	99
Coleus.....	283
Colocasia	
(See Caladium 247)	
Convallaria.....	252
Convolvulus.....	371
Corchorus	
(See Kerria 318)	
Cordylina.....	103, 278, 280
(See Dracæna 111)	
Coreopsis.....	184
Cornus.....	303
Cortaderia.....	416
Corypha.....	142
Cosmos.....	225
Cotoneaster.....	305
Cotyledon.....	104, 227
Crassula.....	104
Cratægus.....	305
Crinum.....	253
Crocus.....	242, 253
Croton	
(See Codiaëum 100)	
culture.....	100
propagation.....	100
ringing.....	101
Cryptomeria.....	305
Cuphea.....	284
Cupressus	
(For propagation	
see Juniperus 318)	
Curculigo.....	105
Cycas.....	105

	Page
Cyclamen.....	106
Cyclophorus.....	399
Cydonia.....	307
Cyperus.....	417
Cypripedium.....	108
Cyrtomium.....	383, 392
Cystopteris.....	387
Cytisus.....	108
Dabæcia.....	308
Dactylis.....	417
Dahlia	
classification.....	254
culture.....	256
habitat.....	253
propagation.....	256
storage.....	257
Daisy, Paris.....	145
Dalchampia.....	108
Daphne	
<i>Blagayana</i>	308
<i>Cneorum</i>	308
<i>Laureola</i>	308
<i>Mezereum</i>	308
<i>odora</i>	109, 308
<i>pontica</i>	308
Daphne.....	109
Date.....	147
Davallia.....	392
(See also Drynaria 394)	
Delphinium.....	184
Dendrobium.....	109
Dennstædtia.....	387
Desmodium.....	109
(See Lespedeza 199)	
<i>gyrans</i>	137
Deutzia.....	308
Dianthus.....	184
Caryophyllus (See	
Carnation 83)	
Dicentra.....	185
Dichorisandra.....	109
Dichroa.....	109
Dicksonia.....	383, 393
hardy (See Denn-	
stædtia 387)	
Dietmanus.....	185
Dieffenbachia.....	110
Diervilla.....	309
Digitalis.....	186
Dimorphotheca.....	227
Dionæa.....	110
Dizygotheca	
(See Aralia 59)	
Dodecatheon.....	186
Dolicos japonicus	
(See Pueraria 377)	
Doronicum.....	186

	Page
Dracæna	
(See also Cordy-	
line 111)	
Drosera.....	113
Drynaria.....	394, 397
Dryopteris.....	387
Duchesnea.....	186
Dusty Miller.....	282
Echeveria	
(See Cotyledon 227)	
Echinacea.....	188
(See Rudbeckia 212)	
Eichhornia.....	404
Elægnus.....	310
Elæodendron	
(See Aralia 59)	
Elymus.....	417
Enkianthus	
layers of.....	33
Epiphyllum.....	113
Eranthemum.....	114
Eranthis.....	257
Eremurus.....	257
Erianthus.....	419
Erica.....	310
Erica.....	115
soil for.....	13
Erodium.....	188
Erpetion	
(See Viola 219)	
Erythrina.....	115
Erythronium.....	257
Eschscholtzia.....	227
Eucharis.....	258
Eulalia.....	419
Euonymus.....	310
scale.....	50
Eupatorium.....	117
Euphorbia.....	117
Eurya.....	120
Euterpe.....	142
Exacum.....	120
Exochorda.....	311
Farfugium	
(See Ligularia 200)	
Ferula.....	188
Fatsia	
(See Aralia 59)	
Fatsia.....	24, 120
Felicia.....	121
Festuca.....	419
Ficus.....	121, 284
Filipendula	
(See Spiræa 217)	
Fittonia.....	124
Forsythia.....	311
layers.....	33

	Page		Page		Page
<i>Fragaria</i>		<i>Helleborus</i>	190	<i>Isotoma</i>	286
(See <i>Duchesnea</i> 186)		<i>Hemerocallis</i>	191	<i>Itea</i>	317
<i>Franciscea</i>		<i>Hepatica</i>	191	<i>Ixora</i>	133
(See <i>Brunfelsia</i> 75)		<i>Heuchera</i>	191	<i>Jacobinia</i>	133
<i>Freesia</i>	258	<i>Hibiscus</i>		<i>Jasmine</i>	133
<i>Fritillaria</i>	259	greenhouse sorts. .	130	<i>Jasmine, Cape</i>	
<i>Fuchsia</i>	124	hardy species....	312	(See <i>Gardenia</i> 125)	
<i>Funkia</i>	188	<i>Hidalgoa</i>	372	hardy.....	317
<i>Furcraea</i>	125	<i>Hippeastrum</i>	263	<i>Jasminum</i>	133
<i>Gaillardia</i>	189	<i>Holboellia</i>		<i>Jerusalem Cherry</i> ...	000
<i>Galanthus</i>	259	(See <i>Stauntonia</i> 380)		<i>Juniperus</i>	318
<i>Galax</i>	189	<i>Hollyhock</i>		<i>Kadsura</i>	375
<i>Galtonia</i>	260	(See <i>Althea</i> 169)		<i>Kalmia</i>	318
<i>Gardenia</i>	125	rust.....	50	<i>Kentia</i>	133, 142
<i>Gazania</i>	228	<i>Hosta</i>		<i>Kerria</i>	318
<i>Genista</i>	108	(See <i>Funkia</i> 188)		<i>Kniphofia</i>	196
<i>Gentiana</i>	189	<i>Howea</i>		<i>Kochia</i>	229
<i>Geranium</i>	189	(See <i>Kentia</i> 133)		<i>Kœlreuteria</i>	320
(For so-called <i>Geraniums</i> of the florist see <i>Pelargonium</i> 288)		<i>Hoya</i>	373	<i>Kœniga</i>	
<i>Gerbera</i>	126	<i>Humulus</i>	373	(See <i>Alyssum</i> 224)	
<i>Gillenia</i>	189	<i>Hunnemannia</i>	228	<i>Laburnum</i>	320
<i>Gladiolus</i>		<i>Hyacinth</i>	242, 264	<i>Lachenalia</i>	265
crossing technique	41	forcing Roman....	243	<i>Lælia</i>	133
digging.....	262	<i>Hydrangea</i>		<i>Lagerstroemia</i>	320
fertilizer.....	260	<i>arborescens</i>	313	<i>Lantana</i>	287
planting.....	262	French hybrids...	130	<i>Lapageria</i>	375
propagation.....	262	greenhouse culture	130	<i>Lastrea</i>	278
soil.....	260	hardy sorts.....	313	<i>Latania</i>	134, 142
value.....	260	<i>Hortensis</i>	132, 313	<i>Lathyrus</i>	
<i>Gloriosa</i>	262	<i>opuloides</i>	130, 313	perennial.....	375
<i>Gloxinia</i>	127	<i>Otaksa</i>	313	(See <i>Sweet Peas</i>	
sowing seeds....	25	<i>paniculata</i>	313	157, 238)	
<i>Goniophlebium</i>	397	<i>quercifolia</i>	315	<i>Laurus</i>	321
<i>Glycine</i>		<i>Hydrocleis</i>		<i>Leontopodium</i>	199
propagation.....	33	(See <i>Limnocharis</i> 405)		<i>Lespedeza</i>	199
<i>Godetia</i>	228	<i>Hypericum</i>	315	<i>Leucojum</i>	265
<i>Goodyera</i>	190	<i>Iberis</i>	193	<i>Lewisia</i>	199
<i>Gooseberry Mildew</i> ..	45	<i>Ilex</i>	315	<i>Libonia</i>	
<i>Gordonia</i>	312	<i>Imantophyllum</i>		(See <i>Jacobinia</i> 133)	
layering.....	33	(See <i>Clivia</i> 252)		<i>Licuala</i>	142
<i>Grevillea</i>	129	<i>Impatiens</i>	284	<i>Ligularia</i>	200
<i>Gyneryum</i>		<i>Inga</i>	132	(See <i>Farfugium</i> 278)	
(See <i>Cortaderia</i> 416)		<i>Ipomœa</i>	373	<i>Ligustrum</i>	321
<i>Gypsophila</i>	190	<i>Iresine</i>	285	layers.....	33
<i>Halesia</i>	312	<i>Iris</i>		<i>Lilac</i>	
<i>Hamelia</i>	129	bearded.....	193	(See <i>Syringa</i> 334)	
<i>Heather</i>		bulbous.....	264	Mildew.....	50
(See <i>Erica</i> 115, <i>Calluna</i> 180)		dwarf.....	196	<i>Lilium</i>	
<i>Heather, White Irish</i>	308	English.....	264	greenhouse sorts. .	266
<i>Hedera</i>	371	German.....	193	hardy sorts.....	269
<i>Hedychium</i>	130	Japanese, <i>cut</i>	198	preparing bulbs	
<i>Helianthus</i>	190	<i>Madam Chereau</i> ,		for potting.....	268
<i>Helichrysum</i>	228	<i>cut</i>	194	<i>speciosum</i>	268
<i>Heliotropium</i>	284	<i>pallida dalmatica</i> ,		<i>Lily</i>	
		<i>cut</i>	195	(See <i>Lilium</i> 266)	
		propagation.....	196	<i>Lily of the Valley</i> ..	252
		<i>reticulata</i>	265	<i>Limnocharis</i>	405
		species.....	195		

	Page		Page		Page
Lindelofia.....	200	Monstera.....	137	Ononis.....	204
Linnæa.....	200	Moonflower		Onosma.....	205
Linum		(See Ipomœa 373)		Onychium.....	383, 396
(See Reinwardtia 151)		Morina.....	204	Ophiopogon.....	205
<i>grandiflorum</i>	229	Musa.....	137, 287	Oplismenus	
<i>perenne</i>	229	Muscari.....	270	(See Panicum 419)	
Lippia.....	134	Mussœnda.....	137	Opuntia	
Livistona.....	134, 142	Myosotis.....	204	(See Cactus 76)	
Lobelia		Myriophyllum.....	405	Orchids.....	141
<i>Erinus</i>	229	Myrsiphyllum		potting material	
<i>littoralis</i>		(See Asparagus and		for.....	141
(See Pratia 211)		Smilax 63)		gernera	
perennial sorts....	201	Narcissus.....	270	Calanthe.....	77
Lomaria		classification.....	270	Cattleya.....	89, 140
(See Blechnum 392)		forcing.....	243	Cœlogyne.....	99
Lonicera		Paper White.....	243	Cypripedium.....	108
climbing sorts....	375	Nasturtium		Dendrobium.....	109
shrubs.....	321	(See Tropæolum,		Goodyera.....	190
Lopezia.....	134	241)		Lælia.....	133
Lupinus.....	201	Nelumbium.....	405	Odontoglossum..	139
Lychnis		from seed.....	407	Oncidium.....	141
(See Agrostemma		insect enemies... 407		Phalanopsis....	147
168)		starting tubers... 407		Vanda.....	161
propagation.....	24	Nepenthes.....	24, 137	Orobis.....	205
Lygodium.....	387	Nepeta		Osmanthus.....	325
Lysimachia....	201, 376	(See Ground Ivy 280)		Osmunda.....	388
Lythrum.....	203	Nephrolepis.....	394	Othonna.....	288
Magnolia.....	323	Nerine		Ouvirandra	
layers.....	33	(See Amaryllis 244)		(See Aponogeton 403)	
Mahernia.....	134	Nerium.....	139	Oxalis	
Malvaviscus.....	135	Nertera.....	139	<i>Bowiei</i>	271
Manettia.....	376	Neviusia.....	325	<i>cernua</i>	271
propagation.....	24	Nicotiana.....	231	<i>crydentelles</i>	288
Maple		Nierembergia.....	231	culture indoors... 271	
flowering.....	52	Nigella.....	232	culture out of	
Japanese.....	293	Niphobolus... 278, 399		doors.....	288
Maranta.....	135	Nymphœa.....	407	<i>dendroides</i>	137
(See Calathea 77)		hardy sorts.....	409	<i>hirta</i>	271, 288
Marguerite		hardy sorts from		<i>rubricaulis</i>	271
(See Paris Daisy 145)		seed.....	412	<i>sensitiva</i>	137
Marguerite Leaf		night blooming		<i>versicolor</i>	271
Miner.....	50	section.....	409	Pachysandra.....	205
Matthiola.....	229	soil.....	409	Pæderia.....	376
Maurandia.....	280	starting tubers... 411		Pæonia	
Medinilla.....	135	Summer quarters		(See Pæony)	
Menyanthes.....	203	for.....	411	Palms.....	141
Mertensia.....	203	tender sorts.... 409		Attalea.....	67
Mesembryanthemum		Wintering tender. 411		Areca.....	97
231, 280		Ochna.....	139	Arenga.....	142
Metrosideros....	135	Odontonema.....	139	Caryota.....	143
Microlepidia.....	394	Odontoglossum... 139		Chamærops.....	142
Mingonette.....	234	œnothera.....	204	Chrysalidocarpus.. 97	
Mimosa.....	135	Oleander.....	139	Ceroxylon.....	143
Mimulus.....	203	Olea		Cocos.....	100
Mirabilis.....	231	(See Osmanthus 325)		Corypha.....	142
Miscanthus		Oncidium.....	141	Euterpe.....	142
(See Eulalia 419)		Onoclea.....	387	Howea.....	133
Monarda.....	203			Kentia.....	133

Palms—Continued	Page		Page
Latania.....	134, 142	Phormium.....	147
Licuala.....	143	Phygelius.....	210
Livistona.....	134, 142	Phyllagathis.....	147
Phoenix.....	142, 147	Phyllanthus.....	148
Rhapis.....	142	Phyllostachys	
Seafartha.....	142	(See Bamboo 415)	
Stevensonia.....	143	Phyllotanium.....	163
Thrinax.....	142	Phymatodes.....	397
Pandanus.....	143, 280, 288	Physalis.....	210
Panicum.....	419	Piqueria	
Pansy.....	232	(See Stevia 155)	
growing in frames.....	232	Pitcher Plants	
sowing seed.....	232	(See Sarracenia 153	
Papaver		and Nepenthes 138)	
<i>nudicaule</i>	207	Platycerium.....	396
<i>orientale</i>	207	Platycodon.....	210
<i>Rhæas</i>	233	Plumeria.....	148
<i>somniferum</i>	233	Plumbago	
Papyrus.....	419	<i>capensis</i>	148
Paris Daisy.....	145	<i>Larpentæ</i>	211
Parthenocissus.....	363	<i>zeylanica</i>	148
Passiflora.....	377	Poinsettia.....	117
Paulinia.....	145	<i>cut</i>	119
Paulownia.....	24, 327	Polianthes.....	271
Pavia		Polypodium.....	388, 396
(See <i>Æsculus</i> 294)		<i>glaucum</i> var. <i>Mand-</i>	
Peach leaf curl.....	45	<i>anianum, cut</i>	398
Pelargonium.....	288	Polyscias	
Pennisetum.....	421	(See <i>Aralia</i> 59)	
Pentas.....	290	Polystichum.....	386, 399
Pentstemon.....	208	Portulaca.....	234
Peony.....	205	Potato	
<i>albiflora</i>	207	blight.....	50
<i>anomala</i>	207	bug.....	51
<i>arietina</i>	207	scab.....	46
bud rot.....	50	Potentilla.....	327
<i>moutan</i>	326	Pratia.....	211
grafting.....	30	Primrose	
<i>officinalis</i>	207	(See <i>Primula</i> 149)	
<i>paradoxa</i>	207	pollinating.....	150
<i>peregrina</i>	207	Primula	
shrubby.....	326	<i>denticulate</i>	211
<i>tenuifolia</i>	207	<i>clatior</i>	211
<i>Whitmanniana</i>	207	<i>floribunda</i>	150
Peperomia.....	146	<i>Forbesii</i>	149
Perskia.....	146	<i>hybrida</i>	150
(See also under		<i>Kewensis</i>	150
<i>Epiphyllum</i> 113)		<i>Malacoides</i>	149
Peristrophe.....	290	<i>obconica</i>	149
Petrea.....	377	pollinating flowers.....	150
Petunia.....	233	<i>Sieboldii</i>	211
Phalænopsis.....	147	<i>sikkimensis</i>	211
Philadelphus.....	327	<i>sinensis</i>	149
Phlebodium.....	397	<i>veris</i>	211
Phlox		<i>vulgaris</i>	211
annual.....	234	Prunus.....	327
<i>Drummondii</i>	234	Psedera	
perennial sorts.....	208	(See <i>Ampelopsis</i> 363)	
Phœnix.....	142, 147		
		Ptelea.....	329
		Pteris.....	278, 383, 399
		Pueraria.....	377
		propagation.....	33
		<i>Thunbergiana</i>	378
		Punica.....	329
		Puschkinia.....	242
		Pyrostegia	
		(See <i>Bignonia</i> 364)	
		Pyrus.....	330
		<i>cydonia</i> (See <i>Cy-</i>	
		<i>donia</i> 307)	
		Quisqualis.....	379
		Ramondia.....	212
		Ranunculus.....	271
		greenhouse sorts.....	273
		outdoor.....	273
		propagation.....	273
		varieties.....	271
		Raphiolepis.....	330
		Raspberry	
		canë borer.....	51
		propagation.....	24, 32
		Reinwardtia.....	151
		Reseda.....	234
		Retinispora	
		(For propagation,	
		see <i>Juniperus</i> 318)	
		Rhapis.....	142
		Rheum.....	212
		Rhipsalis.....	151
		Rhododendron.....	330
		grafting.....	29
		lace wing fly.....	50
		soil for.....	13
		Rhodotypos.....	331
		Rhus.....	331
		Rhynchospermum	
		(See <i>Trachelosper-</i>	
		<i>mum</i> 382)	
		Richardia	
		(See <i>Zantedeschia</i> 277)	
		Ricinus.....	236
		Robinia.....	333
		Rochea	
		(See <i>Crassula</i> 104)	
		Rohdea.....	278
		Rose	
		baby Ramblers.....	351
		black spot.....	45
		climbers.....	351
		diseases.....	45
		garden culture	
		cutting.....	356
		planting time.....	353
		preparation of	
		soil.....	353
		pruning.....	355

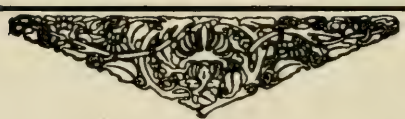
	Page		Page
Roses—Continued		Scutellaria.....	215
greenhouse cul- ture.....	344, 347	Seafortia.....	142
hybrid perpetu- als.....	341, 343	Sedum.....	215
forcing.....	343	Selaginella.....	401
varieties.....	343	<i>cut</i>	400
hybrid Teas.....	341, 343	Senecio	
culture under glass.....	347	<i>candidissima</i>	283
varieties for gar- den.....	347	<i>maritima</i>	283
varieties for greenhouse...	344	<i>mikanoides</i>	291
hydrocyanic acid gas, use of.....	40	Senecio.....	379
insects.....	51	Selenicereus	
penzance hybrids.....	351	(See Cactus 76)	
pernetiana.....	350	Sempervivum.....	216
polyantha.....	351	Sensitive Plants	
propagation.....	356	(See Mimosa 135)	
cuttings.....	356, 357	Shepherdia.....	333
grafting.....	359	Silene.....	216
seeds.....	359	Skimmia.....	153
pruning.....	355	Smilax	
ramblers.....	351	(See Asparagus 63)	
varieties.....	353	Snape dragon	
rugosa hybrids.....	349	(See Antirrhinum	
teas.....	349	172)	
varieties.....	349	<i>anthracnose</i>	51
wichuriana hy- brids.....	350	Solanum	
yellow briars.....	350	climbing sorts.....	379
Rudbeckia.....	212	greenhouse sorts.....	155
Ruellia.....	151	Sphærogyne	
(See Stephanophy- sum 155)		(See Toca 160)	
Russelia.....	152, 278	Spigelia.....	216
Saccharum.....	421	Spiræa.....	333
Saintpaulia.....	153	Spiræa, Florists'	
Salpiglossis.....	236	(See Astilbe 65)	
Salvia.....	214	<i>arunus</i>	216
Sanguinaria.....	214	<i>astilboides</i>	217
Sanchezia.....	290	<i>palmata</i>	217
Sansevieria.....	153	Sprekelia	
Sandersonia.....	273	(See Amaryllis 244)	
Santolina.....	290	Stachys.....	217
Saponaria.....	214	Staphylea.....	334
Sarracenia.....	153, 214	Statice.....	217
Saxifraga.....	214, 290	Stauntonia.....	380
Scabiosa.....	236	Stephanophysum.....	155
Schizanthus.....	236	Stephanotis.....	380
Schrankia		Stevensonia.....	143
(See under Mimosa 135)		Stevia.....	155
Schubertia.....	379	Stigmaphyllon.....	380
Scilla.....	242, 273	Stipa.....	422
		Stokesia.....	217
		Streptocarpus.....	156
		Strelitzia.....	156
		Streptosolen.....	156
		Strobilanthes.....	157, 291
		Styrax.....	334
		Swainsona.....	157
		Sweet Peas	
		Fall sowing.....	239
		indoor culture.....	157
		outdoor culture.....	238
		preparation of soil.....	238
		sowing seed in pots	
		239
		staking.....	239
		Summer treatment	
		239
		Symphoricarpos.....	334
		Syringa.....	334
		layers.....	33
		Tacsonia.....	380
		Tagetes.....	239
		Tamarix.....	336
		Tanacetum.....	218
		Taxus	
		(For propagation	
		see Juniperus 318)	
		Tecoma	
		(See Campsis 367)	
		Tecophilæa.....	242, 273
		Telanthra	
		(See Alternanthera	
		280)	
		Tetranema.....	159
		Thrinax.....	142
		Thuja	
		(For propagation	
		see Juniperus 318)	
		Thunbergia.....	382
		Thymus.....	218
		Thysacanthus	
		(See Odontonema	
		139)	
		Tiarella.....	218
		Tigridia.....	274
		Tinnea.....	160
		Tococa.....	160
		Tomato bloom, hy- bridizing.....	40
		Torenia.....	241, 280
		Toxicophlæa	
		(See Acocanthera 55)	
		Trachelospermum.....	382
		Tradescantia.....	218
		Trichosporum.....	160
		Tricyrtis.....	274
		Trillium.....	274
		Triteleia.....	242
		Tritoma	
		(See Kniphofia 196)	
		Tritonia.....	274
		Tropæolum.....	241
		Tuberosa.....	271
		Tulip.....	242, 275

	Page		Page		Page
Tulip—Continued		Vinca		Violet.....	161
Duc Von Thol...		<i>major</i>	292	indoor culture...	161
243, 275		<i>minor</i>	219	leaf spot.....	51
forcing.....	243	<i>rosea</i>	292	outdoor bedding	
out-door culture..	242	Viola		sorts.....	219
Ulmaria		<i>blanda</i>	211	propagation.....	162
(See <i>Spiræa</i> 217)		<i>cornuta</i>	219	saw-fly.....	51
Uniola.....	422	<i>cucullata</i>	211	Vitex.....	338
Ulex.....	336	<i>hederacea</i>	219	Vitis <i>heterophylla</i>	
Valloradia		<i>lutea</i>	219	(See <i>Ampelopsis</i> 363)	
(See <i>Plumbago</i> 211)		<i>odorata</i> (Greenhouse		Wistaria.....	382
Vallota.....	275	Violet 161)		Woodwardia.....	386
Vanda.....	161	Pansy.....	232	Weigela	
Verbascum.....	218	<i>papilionacea</i>	211	(See <i>Diervilla</i> 309)	
Verbena.....	241	<i>pedata</i>	211	Xanthoceras.....	338
Veronica.....	219	<i>pubescens</i>	211	propagation.....	24
Viburnum.....	336	<i>rotundifolia</i>	211	Xanthosoma.....	163
Victoria.....	414	<i>tricolor</i> (Pansy)..	232	Yucca.....	340
		Tufted Pansy....	219	Zantedeschia.....	277
				Zephyranthes.....	277
				Zinnia.....	241
				Zizania.....	422

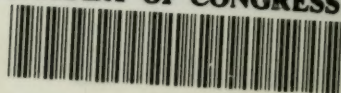
Index

	Page		Page		Page
Annuals.....	222	Damping off.....	49	Grafting.....	26
sowing.....	222	Diseases.....	43	cleft.....	28
time to sow.....	222	list of.....	50	crown.....	29
transplanting.....	223	Division of plants..	24	inarching.....	29
Ammoniacal Copper		Drainage.....	17	root.....	30
Carbonate.....	45	Emasculation.....	40	tongue.....	29
Ants.....	50	Emulsions.....	48	vener.....	29
Aphids.....	47, 48, 50	Ferns.....	383	wax.....	28
Arsenate of Lead....	48	gathering spores..	385	whip.....	29
Bedding Plants.....	278	hardy.....	386	Grain smut.....	46
Bonemeal.....	13	insect enemies....	386	Grasses.....	415
Bordeaux Mixture...	43	soil for sowing		Greenhouse plants..	52
Borers.....	47	spores.....	385	Hellebore, insecti-	
Caustic potash....	47	sowing spores....	385	cide.....	48
Kerosene emulsion	47	use of hydrocyanic		Hybridization.....	39
On herbaceous		acid gas.....	49	Hydrocyanic acid	
plants.....	50	viviparous sorts..	385	gas.....	49
Tarred paper.....	47	Fish-Oil soap.....	47	Use for Azalea...	49
Wire protectors..	47	Flea beetles.....	50	Bulbs.....	49
Botanical—Common		Formalin.....	46	Carnations.....	49
Names, List of....	429	Fruit trees, dwarf..	27	Chrysanthem-	
Budding.....	30	Flower, Bean.....	40	mums.....	49
Bud Moth.....	50	Calendula (illus.)..	40	Cinerarias.....	49
Bulbs.....	242	Carnation.....	42	Ferns.....	49
forcing.....	243	China Aster.....	39	Roses.....	49
outdoor culture...	242	Chrysanthemum...	39	Insects.....	46
Use of hydrocyanic		Corn.....	39	list of.....	50
acid gas.....	49	Cucumber.....	42	Kerosene emulsion..	48
Carbolic Acid Insect-		Daisy-like.....	39	Layering.....	31
icide.....	48	(illus.).....	40	Chinese.....	32
Carbon bisulphide...	50	Gladiolus.....	42	continuous.....	32
Charcoal.....	13	(illus.).....	41	mound.....	32
Common—Botanical		Lettuce.....	39	simple.....	31
Names, List of....	424	Orchid.....	39	tip.....	32
Contact insecticides.	47	Pea.....	40	Leaf cuttings.....	23
Corms.....	242	(illus.).....	38	Leaf spot...	43, 45, 50
Corrosive sublimate.	46	Perfect.....	39	Lime and sulphur...	45
Crossing plants....	39	Petunia.....	42	Lime, slaked for in-	
Current worm.....	48	Poppy.....	39	sects.....	48
Cuttings.....	23	Pumpkin.....	42	Maggots.....	48, 50
dormant wood....	23	Rose.....	39	Manures.....	13
leaf.....	23	Squash.....	42	Mealy bug.....	48, 50
of shrubs.....	23	(illus.).....	40	Moles.....	50
of perennials.....	23	Tomato.....	40	Mildew.....	45
temperatures for...	23	Zinnia.....	39	Millipedes.....	50
Cut worms.....	48	Fungicides.....	43	Mulching.....	21

	Page		Page		Page
Names		Propagation		Soils, potting	13
botanical.....	34	budding.....	30	ridding soil of	
botanical — com-		cuttings.....	23	weeds.....	24
mon, list of.....	429	division.....	24	sterilizing with	
common names,		grafting.....	26	formalin.....	46
use of.....	34	layering.....	31	Sowbug.....	51
common — bo-		seeds.....	24	Sprays.....	43
tanical, list of...	424	Pyrethrum — insec-		Stamens.....	39
scientific.....	34	ticide.....	48	Sulphur as fungicide.	45
species names, list					
of.....	36	Red spider.....	51	Temperatures re-	
what they mean..	34	Root insects.....	47	quired by plants..	423
why used.....	34	Root lice.....	51	Thrips.....	48, 50
Nematodes.....	50	Rust.....	43, 45	Tobacco as insecti-	
Nicotine as insecti-				cide.....	47
cide.....	47	Scale insects....	45, 48	dust.....	47
Paris Green.....	48	Scientific names....	34	extract.....	47
Perennials.....	165	Seeds, propagation		Tuber.....	242
Pistils.....	39	by.....	24	Tuberous roots....	242
Plant lice		saving.....	42, 150	Vines.....	360
(See Aphids)		sowing annuals...	223	Watering.....	20
Poison bait.....	48	sowing fine.....	25	Water Plants.....	402
Poisonous insecti-		Shrubs.....	293	labels for.....	402
cides.....	48	Slips		Waterside Plants....	402
Potassium sulphide.	45	(See cuttings 23)		Weevils.....	50
Potting Plants.....	13	Slugs.....	48, 51	White fly.....	49
Pots, clean.....	17	Soap as insecticide.	47	White Grubs.....	50
		for scale.....	47	Window Box Plants.	278



LIBRARY OF CONGRESS



00027609971